O‘ZBEKISTON RESPUBLIKASI
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O‘ZBEKISTON RESPUBLIKASI
AVTOMOBIL YO‘LLARI DAVLAT QO‘MITASI

TOSHKENT AVTOMOBIL YO‘LLARINI LOYIHALASH, QURISH VA EKSPLUATATSIYASI INSTITUTI

Ro‘yxatga olindi:
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O`quv ishlari bo‘yicha prorektor
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MUHANDISLIK GRAFIKASI VA AXBOROT TEXNOLOGIYALARI” KAFEDRASI

“AXBOROT TEXNOLOGIYALARI VA JARAYONLARNING MATEMATIK MODELLASHTIRISH” FANIDAN LABORATORIYA VA AMALIYOT ISHLARI UCHUN O‘QUV - USLUBIY QO‘LLANMA

D.ABDUKADIROVA

ТОШКЕНТ – 2018

“Axborot texnologiyalari va jarayonlarning matematik modellashtirish” fanidan laboratoriya va amaliyot ishlari uchun o‘quv-uslubiy qo‘llanma Toshkent, TAYLQ va EI, 2018 yil - 329 bet.

ANNOTATSIYA

Ushbu laboratoriya va amaliyot ishlari uchun o‘quv-uslubiy qo‘llanma O‘zbekiston Respublikasining “Ta’lim to‘grisidagi” qonun va kadrlar tayyorlash milliy dasturini xayotga tadbiq etish maqsadida davlat ta’lim standartlari asosida ishlab chiqilgan. Uning mazmuni umumiy ta’lim maktablarida o‘qitiladigan “Informatika” va o‘rta maxsus, kasb ta’limi muassalarida o‘qitiladigan “Axborot texnologiyalari” fanlarning uzviy da’vomi bo‘lib, “Axborot texnologiyalari va jarayonlarning matematik modellashtirish” umum ta’lim fanidan Toshkent Avtomobil yo‘llarini loyihalash, qurish va ekspluatatsiyasi instituti ta’lim yo‘nalishi: 5111000 - Kasb ta’limi (5111000 avtomobil yo‘llari, ko‘priklar, tonnellar, yo‘l o‘tkazgichlar va aerodromlarni qurish), 5232900 - Ishlab chiqarishni tashkil etish va boshqarish(tarmoqlar va sohalar bo‘yicha), 5310900 - Metrologiya, standartlashtirish va maxsulot sifati menejmenti (sohalar bo‘yicha), 5313100 - Avmobil transporti, yo‘l-qurilish mashinalari va jihozlarining ekspiuatatsiyasi (turlari bo‘yicha), 5620300 - Transport logistikasi (avtomobil transporti), 5630100 - Ekologiya va atrof muhit muhofazasi (tarmoqlar va sohalar bo‘yicha), 5620400 - Yo‘l harakatini tashkil etish bakalavriyatning barcha texnik yo’nalishlari talabalari uchun mo’ljallangan.

Laboratoriya va amaliyot ishlari uchun o‘quv-uslubiy qo‘llanma Toshkent avtomobil yo‘llarini loyihalash, qurish va ekspluatatsiyasi instituti Kengashining 2018 yil 19 sentabr 1 -sonli bayoni bilan tasdiqlangan.

Tuzuvchi:
D.Abdukadirova - “Muhandislik grafikasi va axborot texnologiyalari” kafedrasi katta o‘qituvchi

Taqrizchilar:
T.Ganiyeva - I.Karimov nomidagi TDTU “Axborot texnologiyalari” kafedrasi katta o‘qituvchi.

A.Nam - TAYLQ va EI, “Muhandislik grafikasi va axborot texnologiyalari” kafedrasi katta o‘qituvchi.

MUNDARIJA

KIRISH

O‘zbekiston Respublikasi Prezidentining farmoni Davlat boshqaruvi tizimini yanada takomillashtirish, mamlakat iqtisodiyoti tarmoqlari va sohalarida zamonaviy axborot texnologiyalari va kommunikatsiyalarini, “elektron hukumat” tizimi hamda axborot tizimlarini jadal tatbiq etish, telekommunikatsiya infratuzilmasini va ma’lumotlarni uzatish tarmoqlarini modernizatsiya qilish maqsadida:

1. O‘zbekiston Respublikasi aloqa, axborotlashtirish va telekommunikatsiya texnologiyalari davlat qo‘mitasi negizida O‘zbekiston Respublikasi Axborot texnologiyalari va kommunikatsiyalarini rivojlantirish vazirligi tashkil qilinsin.

2. Quyidagilar O‘zbekiston Respublikasi Axborot texnologiyalari va kommunikatsiyalarini rivojlantirish vazirligining asosiy vazifalari hamda faoliyat yo‘nalishlari etib belgilansin:

Axborot texnologiyalari va kommunikatsiyalar sohasida, “elektron hukumat”ni joriy etishda yagona davlat siyosati amalga oshirilishini ta’minlash, axborot texnologiyalarini rivojlantirishning jahon darajasidan kelib chiqqan holda milliy axborot-kommunikatsiya tizimini tatbiq etish va rivojlantirish yuzasidan kompleks dasturlarni ishlab chiqish va amalga oshirish;

Internet tarmog‘ining milliy segmenti yanada shakllantirilishini ta’minlash, mamlakatimizning turli yo‘nalishlardagi zamonaviy veb-resurslarini, shu jumladan, yosh avlodning axborotga bo‘lgan va intellektual talab-ehtiyojlarini qondirish maqsadida tarmoq resurslarini rivojlantirish uchun zarur texnik va qulay shart-sharoitlarni yaratish;

Zamonaviy kommunikatsiya vositalari sohasida ilmiy tadqiqotlar va ishlanmalarni, kadrlarni tayyorlash, qayta tayyorlash va malakasini oshirishni tashkil qilish, dasturiy mahsulotlar, axborot tizimlari va ma’lumotlar bazalarini ishlab chiqish va tatbiq etish, axborot xavfsizligini ta’minlash va axborot-kommunikatsiya texnologiyalarining boshqa sohalarida shunday ishlarni tashkil etish.

I-I. LABORATORIYA MASHG‘ULOT MAVZULARI

I. SEMESTR

1 LABORATORIYA ISHI.
FAYL VA KATOLOGLAR BILAN ISHLASH. AXBOROT O‘LCHOVI BOYICHA MASALALAR YECHISH.

Maqsad: Kompyuterning asosiy va qo‘shimcha qurilmalari haqida ma’lumotlarga ega bo‘lish va undagi fayl, katologlar bilan tanishish. Axborot o‘lchovi birligi boyicha masalalar yechishni o‘ganish.

Nazariy qism:
Kompyuter qurilmalari. Axborot o‘lcov birligiga oid masalalar yechish.
1 Bayt = 8bit
1 Kbayt = 1024 bayt = 2^{10} bayt
1 Mbayt = 1024 Kbayt = 2^{20} bayt
1 Gbayt = 1024 Mbayt = 2^{30} bayt
1 Tbayt = 1024 Gbayt = 2^{40} bayt
1 Pbayt = 1024 Tbayt = 2^{50} bayt

1-Masala.
Axborot uzatish tezligi 1024000 bit/s. 5 sekundagi fayl hajmini toping?
Berilgan
v=1024000 bit/s
t= 5 s
I=?
Fayl hajmini $I = v * t$ form ula bilan topiladi. v bu yerda o‘tkazish tezligi, t axborot uzatilgan vaqt. Demak

$$I = v * t = 1024000 \frac{bit}{s} * 5\ s = 5120000\ bit = 625\ Kbayt$$

Javob: 5 s da o‘tgan axborot hajmi 625 Kbaytga teng.
Bitdan baytga o‘tish uchun 8 ga bo‘lish kerak. Kbaytga o‘tish uchun 1024 ga bo‘lish kerak.

2-Masala.
Kanalning o‘tkazish tezligi 56 Kb/s. 1 Kbayt axborot qancha vaqtda uzatiladi.
Berilgan
v=56 Kb/s
I= 1 Kbayt
t=?
Fayl hajmini $I = v * t$ formula bilan topiladi. Bu yerda v o‘tkazish tezligi, t axborot uzatilgan vaqt.
Demak bu formuladan uzatish vaqtini $t = \frac{I}{v}$ formula bilan hisoblaymiz.

$$t = \frac{I}{v} = \frac{1 * 1024 * 8\ bit}{56 * 1024\ bit/s} = \frac{1}{7}\ s$$

Javob: $\frac{1}{7}$ sekunda axborot o‘tib bo‘ladi.

Kbitdan bitga o‘tish uchun 1024 ga ko‘paytirish kerak.
3-Masala.
Agar 10 Mbayt hajmdagi axborot 0.5 sekunda uzatilsa, kanalning o‘tkazish tezligini toping?
Berilgan
I= 10Mbayt
t=0.5 s
v=?
Fayl hajmini $I = v * t$ forula bilan topiladi. Bu yerda o‘tkazish tezligi, t axborot uzatilgan vaqt. Bu masalada uzatish tezligi quyidagicha topiladi.

$$v = \frac{I}{t}$$

$$v = \frac{10\ Mbayt}{0.5\ s} = \frac{10 * 2^{23}\ bit}{0.5\ s} = 20 * 2^{23}\frac{bit}{s} = 5 * 2^{25}\ bit/s$$

Javob: Tezligi $5 * 2^{25}\ bit/s$ bo‘lganda 10 Mbayt axborot 0.5 sekundda o‘tadi.
Mbaytdan bitga o‘tish uchun $2^{20} * 8$ ga ko‘paytirish kerak.

Savollar:

1.Shaxsiy kompyuterning asosiy qurilmalari
2.Printer nima?
3.Skaner

1.Shaxsiy kompyuterlar (inglizcha Personal Computers, (PC)) quyidagi qurilmalardan tashkil topgan:

-tizimli bloki;
-monitor;
-klaviatura;
-sichqoncha;

IBM firmasiga ta’luqli shaxsiy kompyuterlar inglizcha **IBM PC** kompyuterlari atamasida yuritiladi va ular hozirgi kunda keng tarqalgan.

Rasm1.1.

Tizimli bloke.

Tizimli bloki odatda desktop (yassi) yoki town (minora) ko‘rinishida ishlab chiqariladi.
Kompyuterning asosiy qismlari tizimli blokida joylashgan bo‘lib, ular quyidagilardir:

Tezkor xotira (RAM- Random Access Memory- ixtiyoriy kirish mumkin bo‘lgan)*mikroprotsessor,qurulmalar nazoratchilari,(*yani kontrollerlar,adapterlar,
elektir manbai bilan ta’minlash bloki), *yumshoq disk qurilmasi* (FDD-Floppy Disk
Driver), qattiq disk qurilmasi (HDD-Hard Disk Driver) , faqat o‘qish uchun mo‘l-
jallangan lazer disk qurilmasi (CD ROM-Compact Disk Read Only Memory),
shinalar ,modem va boshqa qurilmalardan iborat . Tizimli blokiga uning parallel (LPT) va ketma-ket (COM) portlari orqali ko‘plab tashqi qurilmalarni ulash mumkin.

Mikroprotsessor. Mikroprotsessor kompyuterning amal bajaradigan qismi bo‘lib , u ma’lumotlarni berilgan dastur asosida qayta ishlaydi.

Mikroprotsessor 140 tacha turli arifmetik va mantiqiy amallarni bajaradi.IBM rusumli kompyuterlarda Intel tipidagi (shu nomli firma ishlab chiqgan) mikroprotsessorlar ishlatiladi.Bu firma o‘z faoliyati mobaynida
Intel-8080, 80286, 80386, 80486, Pentium, Pentium Pro (professional) mikroprotsessorlari ishlab chiqarilgan bo‘lib, hozirda faqat zamon talablariga javob
beradigan **Pentium-III,Pentium-IV** mikroprotsessorlarigina bozorga chiqarmoqda, xolos. Shuni aytish joizki, bu protsessorlar faqat Intel firmasida ishlab chiqarilishi shart emas. Uning litsenziyasi asosida bunday mikroprotsessorlar, ishchi kuchi arzon bo‘lgan, janubiy- sharqiy Osiyo mamlakatlarida ko‘plab ishlab chiqarilmoqda. Bundan tashqari, *IBM kompyuterlariga moslik* shartini bajaradigan boshqa firmalar: AMD ,Cyrix, Celeron va hakozo ishlab chiqgan mikroprotsessorlar ham keng qo‘llaniladi. Ammo boshqa firmalar ishlab chiqgan mikroprotsessorlar Intel- protsessorlardan umuman aytganda kuchsizroq hisoblanadi. Hozirda MMX-protsessorli kompyuterlar keng qo‘llaniladi. Protsessorlarning tezligi megagertslar (Mgts) sekundda o‘lchanadi.

MMX Pentium protsessori. Intel firmasining keyingi avlod protsessori sifatida 1997-yil yanvar oyidan boshlab chiqarilayotgan **MMX** (Matrix Multiplication Extension) **Pentium** protsessorini aytish mumkin. Dastavval bu protsessor matritsalarni ko‘paytirish uchun kengaytma nomi bilan atalgan bo‘lsa,
keyinchalik MultiMedia Extension-multimedia uchun kengaytma deb atala boshladi. Bu yangi protsessorni ishlab chiqishdan maqsad, keyingi yillarda ommaviy qo‘llanilib borilayotgan kompyuterning multimedia (ovozi, grafik,tasvir)
imkomiyatlarini har tomonlama barkamollik darajasiga ko‘tarish multimedia amaliyotlarni tez bajarishni ta’minlashdan iborat. Bu amallar qatoriga, jumladan multimedia berilganlarni, ikki va uch o‘chovli grafiklarni tez bajarish kiradi. Shu bilan birga bu protssessor ko‘paytirish va qo‘shish amallarini ko‘proq ishlatadigan
amaliy dasturlarda amallarni tezroq bajarishga qaratilgan. Shuning uchun ham uni ko‘proq matematik soprotsessorni talab qilmaydigan, butun sonlar bilan ishlash bilan bog’liq masalalarni yechishda qo‘llash maqsadga muvofiq bo‘lsada tajribalar uning har tomonlama ustunligini ko‘rsatadi.

Hozirda rivojlanayotgan parallel algoritmlar va hisoblashlar uchun ham u qo‘l keladi. Shu bilan birga bu protsessor qo‘zg’aluvchi vergul holatidagi sonlar bilan ishlashni “yoqtirmaydi”. Bunday sonlar bilan ishlash uchun maxsus dastur interfeysi mavjud. U Microsoft firmasining **Direct 3D** (3o‘lchovli interfeysi)dir. Shuning uchun ham uning hozirda ko‘p tarqalayotganligiga ajablanmasa ham bo‘ladi.

Rasm1.2.

Xotira.

Xotira kompyuterda dasturlar va berilganlarni amal natijalarini saqlaydigan qurilma. Xotiraning turlari ko‘p:tezkor, doimiy, tashqi, kesh,video va boshqalar.

Tezkor xotira kompyuterning muhim qismi bo‘lib, protsessor undan amallarni bajarish uchun dastur,berilganlarni oladi amalni bajarib, natijani yana unda saqlaydi. Shuni alohida ta’kidlash lozimki, kompyuter o‘chirilsa, tezkor xotirada saqlanayotgan dasturlar va berilganlar yo‘q bo‘lib ketadi. Shuning uchun ularni qattiq diskda yoki disketalarda saqlab qolishkerak. Kompyuter ishlab turganda elektr tokini ogohlantirmasdan o‘chirish, umuman aytganda, katta zarar keltirishi mumkin. Barcha turdagi xotiralar uchun muhim tushuncha uning hajmidir.Kompyuterlarda ma’lumot birligining eng kichik o‘lchovi sifatida **bayt** qabul qilingan bo‘lib, 1bayt 8 bit(ikkili raqam)ga teng. O‘z navbatida bayt bir simvolni (belgini) tasvirlaydi.Familiyangizni kompyuterga kiritish uchun familiyangizda necha harf bo‘lsa, u xotirada shuncha bayt joyni egallaydi. Xotira hajmi birligi sifatida **kilobayt** qabul qilingan va u **K** bilan belgilanadi. O‘z navbatida bir kilobayt 1024 baytga teng.1024 kilobayt esa 1Mbayt (Megabayt) ga
teng.

Rasm1.3.

Xotiraning katta-kichikligiga qarab u yoki bu dasturlar majmuini ishlata olish mumkin. Misol uchun 1 megabayt xotiraga ega kompyuterlarda faqat DOS tizimida ishlash mumkin bo‘lsa, 4 Megabaytli kompyuterlarda imkoniyatlari ko‘proq bo‘lgan dasyurlarni, xususan WINDOWS 3.1, 3.11 dasturlarini ishlatish mumkin. WINDOWS 95 ni to‘laqonli ishlashi uchun 16 Megabayt xotira va kamida 486 protsessorli kompyuter, WINDOWS 98, 2000 amaliyot tizimida ishlash uchun, Foto Shop, Corelldrawe va boshqa hozirgi zamon dasturlarini ishlatish uchun kamida 32 megabayt hotirali va Pentium -2,3 protsessorli kompyuterlar lozimdir. Bu ko‘rsatgichlar yangi protsessorlar va dastur mahsulotlarini paydo bo‘lishi bilan yil sayin oshib boradi.

Rasm1.4.

Xotiraning katta-kichikligiga qarab u yoki bu dasturlar majmuini ashlata olish mumkin. Misol uchun 1 megabayt xotiraga ega komputerlarda faqat DOS tizimlarda ishlash mumkin bo‘lsa 4 megabaytli kompyuterlarda faqat imkoniyatlari ko‘proq bo‘lgan dasturlarni xususan

WINDOWS 3.1,3.11 dasturlarini ishlatish mumkin. WINDOWS 95 ni to‘laqonli ishlatilishi uchun 16 Megabayt xotira va kamida 486 protsessorli kompyuter, WINDOWS 98, 2000 amaliyot tizimida ishlash uchun Foto Shop Corell Drawe va boshqa hozirgi zamon dasturlarini ishlatish uchun kamida 32 Mbayt xotirali va PENTIUM_2,3 protsessorli kompyuterlar lozimdir. Bu ko‘rsatgichlar yangi protsessorlar va dastur mahsulotlarini paydo bo‘lishi bilan yil sayin oshib boradi.

Doimiy xotira. Kompyuterlarda berilganlar unga avvaldan joylashtirilgan doimiy xotira (BIOS-BASIC input- Output System-kiritish chiqarishning asosiy tizimi) mavjud. Bunday xotiradan faqat o‘qish mumkin. Shuning uchun ham u ROM (Read Only Memory-faqat o‘qish uchun) deb ataladi. IBM PC kompyuterlarda bu xotira lampyuter jihozlarini ishlashini tekshirish, amaliyot tizimini boshlang’ich yuklanishini ta’minlash, qurilmalariga xizmat ko‘rsatishining asosiy funktsiyalarini bajarish uchun ishlatiladi.


Rasm1.5.

Kesh xotira. Kesh xotira kompyuter ishlash tezligini oshirish uchun ishlatiladi. U tezkor xotira va mikroprotsessor orasida joylashgan bo‘lib, uning yordamida amallar bajarish tezkor xotira orqali bajarilayotgan amallardan ancha tez bajariladi. Shuning uchun kompyuter xotirasining ko‘proq ishlatiladigan qismi nusxasini kesh xotirada saqlab turadi. Mikroprotsessorning xotiraga murojaatida avvalo kerakli dastur va berilganlar kesh xotirada qidiriladi. Berilganlarni kesh xotirada qidirish vaqti tezkor xotiradagiga nisbatan ancha kam bo‘lgani uchun kesh xotira bilan ishlash vaqti ancha lam bo‘ladi. PENTIUM 2,3 Kompyuterlarda kesh xotira hajmi 512 K ni tashkil qiladi.

Videoxotira. Videoxotira monitor ekraniga video ma’lumotlarni (videotasvirlarni) saqlab turish uchun ishlatiladi. Shuni aytish lozimki, videotasvirlar (ayniqsa rangli) kompyuter xotirasida ko‘p joy egallaydi. Shuning uchun video xotira qancha kam bo‘lmagani yaxshi.


Rasm1.6.

Shina. Kompyuterda har bir qurilmaning ishini boshqruvchi electron tizimlar mavjud b’olib, ular adapterlar deb ataladi. Barcha adapterlar mikroprotsessor va xotira orqali berilganlarni ayirboshlovchi magistral yo‘l deb ataluvchi shinalar orqali bog’langan bo‘ladi. Shunday qilib oddiy so‘z bilan aytsak shinalar turli qurilmalarini bog’lovchi maxsus simlaridir. Kompyuterda bir qancha shinalar bo‘lishi mumkin. Kompyuterlarning electron tizimi electron plata deb, ataluvchi modullardan iborat. Uning modul tuzilishiga ega bolishi kompyuterlar

ta’minlanishi oson bajarish uni foydalanuvchi ehtiyojiga qarab yig’ish va o‘zgartirish imkoniyatini beradi.

Tizim platasi. Kompyuterlarning asosiy platasi hisoblanib, unga BIOS mikroprotsessor, tezkor xotira, kesh xotira, shinalar joylashtirilgan bo‘ladi. Bundan tashqari, unda ba’zi bir qurilmalari, ishni boshqaruvchi electron tizimlar, klaviatura, disk qurilmalari adapteri ham joylashgan bo‘ladi. Hozirda shinalarning PCI ISA turi keng ishlatilmoqda. Bunday shinalarning ma’lumot ayirboshlashi tezligi yuqori bo‘lib, u orqali kompyuterga ko‘p tashqi qurilmalarni ulash mumkin.

Komyuterda kiritish-chiqarish portlari kontrolerlari mavjud bo‘lib, ular tizim blokining orqa qismida joylashgan slot deb ataluvchu joylar orqali printer, sichqoncha va boshqa qurilmalar ulanishi uchun xizmat qiladi. Kiritish-chiqarish portlari parallel va ketma-ket bo‘ladi va ular mos ravishda LPT-LPT4 va COM1-COM3deb belgilanadi. Odatda LPT portga printer va COM portga faks-modem, sichqoncha va boshqa qurilmalar ulanadi.

Monitor. Monitor kompyuterda matn va grafik ma’lumotlarni tasvirlash uchun xizmat qiladi. Garchand tashqi ko‘rinishidan u televizorga o‘xshab ketsada, ular bajaradigan ishlari bilan keskin farq qiladilar. Monitorlar rangli va rangsiz bo‘ladi. Kompyuterlar tarqatadigan nur umuman aytganda zararli, shuning uchun ham ba’zi kompyuterlarda past radiatsiya (Lowe radiation) so‘zlarini uchratish mumkin. Lekin ularning inson organizmiga ta’siri tobora kamayib boradigan rusumlari yaratilmoda. Buning misoli keyingi yillarda chiqarilgan 17-21dyuymli SVGA (SUPER Video Grafic Adapter-katta video grafik adapter) monitorlarda nurlarning ta’sirini ancha kamaytirilishiga erishilganligini keltirish mumkin. Monitor asosiy tavsiflaridan biri uning tasvirlash qobiliyatidir. Tasvirlash qobiliyati ekranning gorizontali va vertikalidagi nuqtalar soni bilan beriladi. Masalan 14 dyuymli monitorda tasvirlash qobiliyati 800x600, 15 dyuymli monitorda 1024x768, 17 dyuymli monitorda 1280x1024 va 21 dyuymli monitorda esa 1600x1200. Bundan tashqari, monitorning yana bir tavsifi tasvirlarini hosil qiluvchi piksellar (nuqtalar) o‘lchovining katta-kichikligidir. Tasvirlash qobiliyati 800x600 ga teng bo‘lgan monitorlarda yaxshi tasvir piksel 0,31 mm ga, 1024x768 ga teng bo‘lgan monitorlarda esa piksel 0,28 yoki 0,25 ga teng bo‘lishi kerak. Monitirning tez ishlashi uning adapteriga bog’liq bo‘ladi. Matn holatida monitorlar nisbatan tez ishlasada, grafik holatda u sekinroq ishlaydi. Uning tezligini oshirish yo‘llari ham mavjud.

Rasm1.7.

2.Tashqi qurilmalar.

Tashqi qurilmalar quyidagi uskunalardan iborat: **Printer, skaner, modem,** strimer, grafik quruvchi va boshqalar.

Printer.

Printerlar kompyuterda olingan natijalarni, dastur va berilganlarni bosmaga chiqarish uchun ishlatiladi. Printer yordamida matnlarni, grafiklarni, rasmlarni rangli va rangsiz

ko‘rinishda bosmaga chiqarish mumkin. Printerlar aso-san uch xil bo‘ladi: *matritsali, oqimli va lazerli*.

Matritsali printerlar nuqtalar yordamida bosmaga chiqaradi. Shuning uchun ham ularni nuqta-matritsali printerlar deb ham atashadi. Bunday printerlar nisbatan sekin ishlaydi, chop qilish sifati uncha yaxshi emas va chop qilish tezligi ham katta emas. Ular keng (A3) va oddiy (A4) chop etish formatiga ega. 24, 48 ignali (nuqta-li) printerlar mavjud bo‘lib, albatta ignalar soni ko‘pligi yaxshi ekanligi tushunarli-dir.

Rasm1.8.

Oqimli printerlar. Bunday printerlar maxsus (rangli va rangsiz) siyohlarni purkash yo‘li bilan ishlagani uchun ular oqimli deb ataladi. Bu printerlarning turli ranglarda chop qilish sifati tiniq va ravshan bo‘lib, ularning-kamchiligi siyohining tez tamom bo‘lib qolishi va uning nozikligidir. Bu printerlar matnlarni nisbatan tez, grafik tasvirlarni esa sekinroq chop etadi.

Lazer printerlar. Lazer printerlar ham sifati, ham tezligi jihatidan eng yax-shi printer hisoblanadi. Ular rangli va rangsiz bo‘ladi.

Bunday printerlarning andozasi sifatida HEWLETTPACKARD (HP) firmasi chiqaradigan HP LaserJet rusumli printerlar qabul qilingan. Lazer printerlarda chop etish juda qulay bo‘lib, u tez (minutiga 8-15 hatto 40 varaqqacha) chop etishi mumkin. Ammo tabiiyki, bunday printerlarning narxlari nisbatan balandroqdir. Uning bir kamchiligi – unda ishlatiladigan toner rang va kortrijning tez almashtirib turilishidadir. Uning bir toneri taxminan 1500-2500 varaqqa yetadi. Albatta bu raqam tejab ishlatishga bog’liq albatta. Shuning uchun lazer printerda chiqarilgan nusxani kseroks orqali ko‘paytirish maqsadga muvofiqdir.

3.Skaner

Skaner-matn, grafika, tasvirlarni kompyuterga kiritishni avtomatlashtirish uchun xizmat qiluvchi qurilma. U hozir asosan ko‘rinishda chiqarilyapti. Uning andozasi sifatida HP (Hewlett Packard) firmasi ishlab chiqaradigan HP Scanjet rusumli skanerlar qabul qilingan.

Uning asosiy tavsifi ma’lumotlarini aniq, tiniq, lozim bo‘lgan rangda (hususan qora rangli) ko‘rinishda chiqarish qobiliyatidir. Ushbu tasvirlash qobiliyati gorizontal va vertical chiziqlardagi nuqtalar (piksellar) soni orqali belgilanadi.

Odatda, bu xarakteristika misol uchun 300x600, 600x1200 ko‘rinishda bo‘ladi. Bu degani gorizontal chiziqlar boyicha nuqtalar soni 300(600), vertical boyicha piksellar soni 600(1200)ta ekanligini bildiradi.

Rasm1.9.

Nuqtalar soni qancha ko‘p bo‘lsa ma’lumotlar aniqroq tasvirga ega bo‘ladi. Tabiiyki, skanerni HP dan boshqa firmalar ham ko‘plab ishlab chiqaradi. Lekin ular Hp Scanjet andozasiga mos kelishi kerak. Hozirda bunday skanerlar Janubiy-sharqiy osiyo mamlakatlarida ko‘plab chiqarilmoqda. Shuni aytish lozimki, dastur vositalari yordamida skanerning tasvirlash qobiliyati ancha kuchaytirilashi mumkin. Skanerlarni ishlatish jarayonida ayniqsa matnlar bilan ish ko‘rilganda u yoki bu milliy til drayverlarini aniq aks ettiruvchi dasturlardan (masalan Fine reader) foydalanish zarur.

Skanerni kompyuterga ulash uchun turli usullardan foydalaniladi. Ba’zi skanerlar maxsus kontrollerga (kengaytiruvchi plata) ega bo‘lib ular u orqali ulanadi. Bunda plata kompyuterningasosiy psatasiga ona platasi maxsus joyga va o‘sha plata orqali o‘rnatiladi.

Ba’zi skanerlar parallel portga to‘g’ridan-to‘g’ri ulanadi. Hozirda asosan SCSI-3 interfeysi orqali ulanadi. Bun andoza kompyuterning ko‘plab tashqi qurilmalarni, shu jumladan skanerni ulash imkoniyatini beradi. Turli kompyuterlar uchun dastur birligini ta’minlash maqsadida TWAIN qaydnoma ishlatiladi.

Demak, agar WINDOWSda shu qaydnoma o‘rnatilgan bo‘lsa, u skanerlar bilan bemalol ishlay oladi. Odatda skaner sotib olinayotganda uni qaysi Amaliyot tizimiga mo‘ljallanganligini bilish lozim. Shu bilan birga hozirda chiqarilayotgan “skanerlarning aksariyati WINDOWSga mos skanerlardir. WINDOWS 98 dan boshlab esa amaliyot tizimlari TWAIN qaydnomasini yaxshi taniydigan bo‘ladi. Shuning uchun ham bu amaliyot tizimlarda skanerlar bilan bevosita ishlash imkoniyati mavjud.

Skaner dastur boshqaruvida ishlaydi. Matnlarni yaxshi tanish uchun maxsus obrazlarni tanuvchi dastur vositalaridan foydalaniladi. Bunday dasturlar hatto qo‘lyozmani ham tanish qobiliyatiga ega. Shunday dasturlar Fine Reader va Cunei Form nomlari bilan ataladi. Bular Rossiyada ishlab chiqilgan bo‘lib, ular haqida to‘la ma’lumotni

Http://www.belsoft.ru

manzil boyicha olish mumkin.

SANOQ SISTEMALARI

Barcha mavjud tillar kabi sonlar tili ham mavjud bo‘lib, u ham o‘z alifbosiga ega. Mazkur alifbo hozir jahonda qo‘llanilayotgan 0 dan 9 gacha bo‘lgan o‘nta arab raqamlaridir, ya’ni: 0,1,2,3,4,5,6,7,8,9. Bu tilda o‘nta belgi (raqam) bo‘lganligi uchun ham, bu til o‘nlik sanoq sistemasi deb ataladi.

Bizning kundalik hayotimizda qo‘llanilayotgan o‘nlik sanoq sistemasi hozirgidek yuqori ko‘rsatkichni tez egallamagan. Turli davrlarda turli xalqlar bir-biridan keskin farqlanuvchan sanoq sistemalaridan foydalanganlar.

Masalan, 12 lik sanoq sistemasi juda keng qo‘llanilgan. Uning kelib chiqishida albatta tabiiy hisoblash vositasi - qo‘limizning ahamiyati katta. Bosh barmog‘imizdan farqli qolgan to‘rttala barmog‘imizning har biri 3 tadan, ya’ni hammasi bo‘lib 12 ta bo‘g‘indan iboratdir. Mazkur sanoq sistema izlari hanuzgacha saqlanib qolgan. Masalan, inglizlarda

uzunlikni o‘lchash birligi:

1 fut = 12 dyum=30 sm,

pul birligi

1 shilling = 12 pens.

Qadimgi Bobilda ancha murakkab bo‘lgan sanoq sistemasi – 60lik sanoq sistemasi qo‘llanilgan. Bu sanoq sistemasining qoldiqlari hozir ham bor. Masalan:

1 soat = 60 minut

1 minut = 60 sekund

XVI – XVII asrlargacha Amerika qit’asining katta qismini egallagan atstek va mayyalarda 20 lik sanoq sistemasi qo‘llanilgan. Bunday misollarni ko‘plab keltirish mumkin.

Biz asosan o‘nlik sanoq sistemasidan foydalanamiz. Lekin, o‘nlik sanoq sistemasidan kichik sanoq sistemalarida sonlarni belgilash uchun arab raqami belgilaridan foydalaniladi. Masalan, beshlik sanoq sistemasida 0, 1, 2, 3, 4 raqamlari, yettilik sanoq sistemasida esa 0, 1, 2, 3, 4, 5, 6 raqamlaridan foydalaniladi.

Hisoblash texnikasida va dasturlashda asosi 2, 8 va 16 ga teng bo‘lgan sanoq sistemalari qo‘llaniladi.

O‘n ikkilik, o‘n oltilik sanoq sistemalarida qanday belgilardan foydalaniladi?- degan savolga javob aniq: raqamlardan keyin lotin alifbosidagi bosh harflardan foydalaniladi.

Shunday qilib, o‘n ikkilik sanoq sistemasida raqamlar 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B kabi; o‘n oltilik sanoq sistemasida esa 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F kabi yoziladi.

Kompyuterlarda boshqa sanoq sistemalaridan quyidagi imkoniyatlari bilan farqlanuvchi ikkilik sanoq sistemasidan foydalaniladi:

- uni ishlashini tashkil etish uchun ikki turg‘un holatli qurilmalar zarur (tok bor – tok yo‘q, magnitlangan yoki magnitlanmagan);
- axborotni ikki holat orqali tasvirlash ishonchli va ta’sirlarga chidamli;
- ikkilikdagi arifmetika boshqalaridan sodda.

Ikkilik sanoq sistemasining asosiy kamchiligi – sonlardagi xona(razryad)larning juda tez ortib ketishidir. O‘nlik sanoq sistemasidan ikkilikka va teskari o‘tkazishlarni kompyuterning o‘zi bajaradi. Lekin kompyuterning imkoniyatlaridan oqilona foydalanish uchun uning tilini tushunish zarur bo‘ladi. Shular sababli sakkizlik va o‘n oltilik sanoq sistemalari ishlab chiqilgan. Bu sistemalardagi sonlar o‘nlik sanoq sistemasi kabi oson o‘qiladi, lekin ikkilik sanoq sistemasidagi sondan 3 (sakkizlikda) va 4 (o‘n oltilikda) marta kam razryad talab qiladi, chunki $\mathbf{8 = 2^3}$ va $\mathbf{16 = 2^4}$.

Pozitsiyali va pozitsiyali bo‘lmagan sanoq sistemalari

Sanoq sistemasi bu – sonlarni o‘qish va arifmetik amallarni bajarish uchun qulay ko‘rinishda yozish usuli.

Qadimda hisob ishlarida ko‘proq barmoqlardan foydalanilgan. Shu sababli narsalarni 5 yoki 10 tadan taqsimlashgan. Keyinchalik o‘nta o‘nlik maxsus nom – yuzlik, o‘nta yuzlik – minglik nomini olgan va h.k. Yozuv qulay bo‘lishi uchun bu muhim sonlar maxsus belgilar bilan ifodalana boshlagan. Agar hisoblashda 2 ta yuzlik, 7 ta o‘nlik, yana 4 ta birlik bo‘lsa, u holda yuzlikning belgisini ikki marta, o‘nlik belgisini yetti marta, birlik belgisini to‘rt marta takrorlashgan. Birlik, o‘nlik va yuzliklarning belgisi bir-biriga o‘xshash bo‘lmagan. Sonlarni bunday yozganda belgilarni ixtiyoriy tartibda joylashtirish mumkin bo‘lgan, chunki yozilgan sonning qiymati tartibga bog‘liq emas. Bunday yozuvda belgi holatining ahamiyati bo‘lmaganidan, mos sanoq sistemasi nopozitsion sistema deb ataladi. Qadimgi misrliklar, yunonlar va rimliklarning sanoq sistemasi nopozitsion edi. Nopozitsion sanoq sistemasi qo‘shish va ayirish amallari uchun ozgina yarasada, ko‘paytirish va bo‘lish uchun butunlay yaroqsiz edi. Ishni osonlashtirish maqsadida hisob taxtalari – abaklar ishlatilar edi. Hozirgi zamon cho‘tlari abakning o‘zgargan ko‘rinishidir.

Qadimgi bobilliklarning sanoq sistemasi dastlab nopozitsion edi, keyinchalik ular belgilarni yozish tartibida ham informatsiya borligini sezishib, undan foydalanishga o‘rganishdi va pozitsion sanoq sistemasiga o‘tishdi. Bunda biz hozir qo‘llayotgan sistemadan (raqamning o‘rni bir xonaga siljitilganda uning qiymati 10 martaga o‘zgaradigan o‘nli sanoq sistemadan) farqli, bobilliklarda belgi bir xonaga siljitilganda sonning qiymati 60 marta o‘zgarar edi (bunday sanoq sistemasi oltmishli sistema deb ataladi). Uzoq vaqtgacha Bobilning sanoq sistemasida nol belgisi, ya’ni bo‘sh qolgan xonaning belgisi yo‘q edi. Odatda, sonlarning tartibi ma’lum bo‘lganidan bu noqulay emas edi. Ammo keng ko‘lamli matematik va astronomik jadvallar tuzish boshlanganda, ana shunday belgiga ehtiyoj tug‘ildi. Bu belgi keyinchalik mixxat yozuvlarda va eramizning boshida Iskandariyada tuzilgan jadvallarda uchraydi. IX asrda nol uchun maxsus belgi paydo boldi. O‘nli sanoq sistemasida sonlar ustida amallar bajarish qoidasi ishlab chiqildi. Muhammad ibn Muso al-Xorazmiy tomonidan yozilgan “Hind hisobi” nomli risola tufayli o‘nli sanoq sistemasi Yevropaga, keyin esa butun dunyoga tarqaldi.

Sanoq sistemasining asosi uchun na faqat 10 va 60 ni, balki birdan katta ihtiyoriy p natural sonni olish mumkin.

Sanoq sistemalarini tashkil etilishi deyarli bir xil. Biror p soni – sanoq sistemasi asosi sifatida qabul qilinib, ixtiyoriy N soni quyidagi ko‘rinishda ifodalanadi:

$N = a_n p^n + a_{n-1} p^{n-1} + ... + a_1 p^1 + a_0 p^0 + a_{-1} p^{-1} + ... + a_{-m} p^{-m}$
Ko‘phad ko‘rinishida ifodalangan shu sonni
$(a_n\ a_{n-1} \dots a_1\ a_0\ a_{-1} \dots a_{-m})_p$
kabi yozish ham mumkin (*n* va *m* – sonning butun va kasr qismi honalari (razryadlari) soni).

Sonning bu kabi ifodalanishida har bir raqam qiymati o‘z o‘rniga qarab turli xil bo‘ladi. Masalan, o‘nlik sanoq sistemasida 98327 sonida 7 – raqami birlikni, 2 – o‘nlikni, 3 – yuzlikni, 8 – minglikni, 9 – o‘n minglikni ifodalaydi (bu hol faqat o‘nlik sanoq sistemasida):
$98327 = 9 \square\square\square 10^4 + 8\square\square\square 10^3 + 3\square\square\square 10^2 + 2\square\square\square 10^1 + 7\square\square\square 10^0$.
Biror boshqa *p* – asosli sanoq sistemasida a_0, a_1, a_2 ... raqamlar a_0, $a_1 p$, $a_2 p^2$,... qiymatlarni bildiradi.

Bunday ko‘rinishda tuzilgan sanoq sistemalari pozitsiyali sanoq sistemalari deyiladi. Ma’lumki, sanoq sistemasidagi raqamlar tartiblangan bo‘ladi. Raqamni surish deganda uni sonlar alifbosida o‘zidan keyin kelgan raqamga almashtirsh tushuniladi. Masalan, 1ni surishda 2ga, 2ni surishda 3ga, va hokazo, almashtiriladi. Eng katta raqamni surih (masalan, o‘nlik sanoq sistemasidagi 9ni) deganda 0ga almashtirish tushuniladi. Ikkilik sanoq sistemasida 0ni surishda 1ga, 1ni surishda 0ga almashtiriladi.

Pozitsiyali sanoq sistemasida **butun sonlarni** quyidagi **qonuniyat asosida hosil qilinadi:** keyingi son oldingi sonning o‘ngdagi oxirgi raqamini surish orqali hosil qilinadi; agar surishda biror raqam 0ga aylansa, u holda bu raqamdan chapda turgan raqam suriladi.
Shu qonuniyatdan foydalanib, birinchi 10 ta butun sonni hosil qilamiz:

- Ikkilik sanoq sistemasida : 0, 1, 10, 11, 100, 101, 110, 111, 1000, 1001;
- Uchlik sanoq sistemasida : 0, 1, 2, 10, 11, 12, 20, 21, 22, 100;
- Beshlik sanoq sistemasida : 0, 1, 2, 3, 4, 10, 11, 12, 13, 14;
- Sakkizlik sanoq sistemasida : 0, 1, 2, 3, 4, 5, 6, 7, 10, 11.

Pozitsion sanoq sistemasi o‘zining qulayligi bilan hayotda keng qo‘llanilmoqda.
Boshqa usulda tuziladigan sanoq sistemalari ham mavjud. Ular pozitsiyaga bog‘liq bo‘lmagan sanoq sistemalari deyiladi. Masalan rim raqamlari. Mazkur sistemada maxsus belgilar to‘plami kiritilgan bo‘lib, ixtiyoriy son shu belgilar ketma-ketligidan iborat bo‘ladi.
Rim sanoq sistemasida

Bir (1)	I belgi bilan;
Besh(5)	V belgi bilan;
O‘n (10)	X belgi bilan;
Ellik (50)	L belgi bilan;
Yuz (100)	C belgi bilan;
Besh yuz (500)	D belgi bilan;
Ming (1000)	M bilan belgilanadi.

Bu belgilar va ularning kombinatsiyasi yordamida turli sonlarni hosil qilinadi. Masalan, 1 dan 3 gacha - I, II, III kabi, to‘rt (4) – IV , 5 – V tarzida ifodalanadi. Bu yerda 4 sonini yozish uchun 5 sonidan 1 sonini ayirib yoziladi, ya’ni I belgi V dan oldinga qo‘yilsa ayirish ma’nosini, agar keyinga qo‘yilsa qo‘shishni anglatadi. Umumiy holda: 6 – VI, 7 – VII, 400 – CD, 600 – DC ko‘rinishda ifodalanadi.
Rim sanoq sistemasida yozilgan sonlarni o‘nlik sanoq sistemasiga quyidagicha o‘tkazish mumkin:

$VI \rightarrow V \geq I \rightarrow 5 + 1 = 6$
$IV \rightarrow (I \geq V)? \rightarrow 5 - 1 = 4$
$XIX \rightarrow X + (I \geq X)? \rightarrow 10 + (10-1) = 19$

XCIX → (X ≥ C)? + (I ≥ X)? → (100-10) + (10-1) =99
MCMLXIII → M+(C ≥ M)?+L+X+I+I+I→1000+(1000-100)+50+1+1+1 =1963.

Demak, bu sistemada har bir belgining ma’nosi va qiymati uning turgan pozitsiyasiga bog‘liq emas. Shuning uchun rim raqamlarini hayotda keng qo‘llash imkoniyati bo‘lmagan. Ammo ularni kitoblar bobini qo‘yishda, soatlarni yozuvida va boshqalarda qo‘llab turamiz.
Misol. Qaysi sanoq sistemasida 21+24 = 100 bo‘ladi?

Yechish: x – qidirilayotgan sanoq sistemasini asosi bo‘lsin. U holda $100_x = 1\cdot x^2 + 0\cdot x^1 + 0\cdot x^0$, $21_x = 2\cdot x^1 + 1\cdot x^0$, $24_x = 2\cdot x^1 + 4\cdot x^0$ bo‘ladi. Demak, $x^2 = 2x + 2x + 5$ yoki $x^2 - 4x - 5 = 0$ bo‘ladi. Bu tenglamaning musbat yechimi x=5 bo‘ladi. Demak, sonlar beshlik sanoq sistemasida berilgan ekan.

2 - LABORATORIYA ISHI
MA’LUMOTLAR BAZASINI ACCESS 2010DA YARATISH. ACCESS2010DA JADVALLAR YARATISH OPERATORLARI

Maqsad: Ma’lumotlar bazasini kompyuterda Accessda yaratish. Berilgan mavzu boyicha ma’lumotlar bazasini kompyuterda loyihalashni o‘rganish.

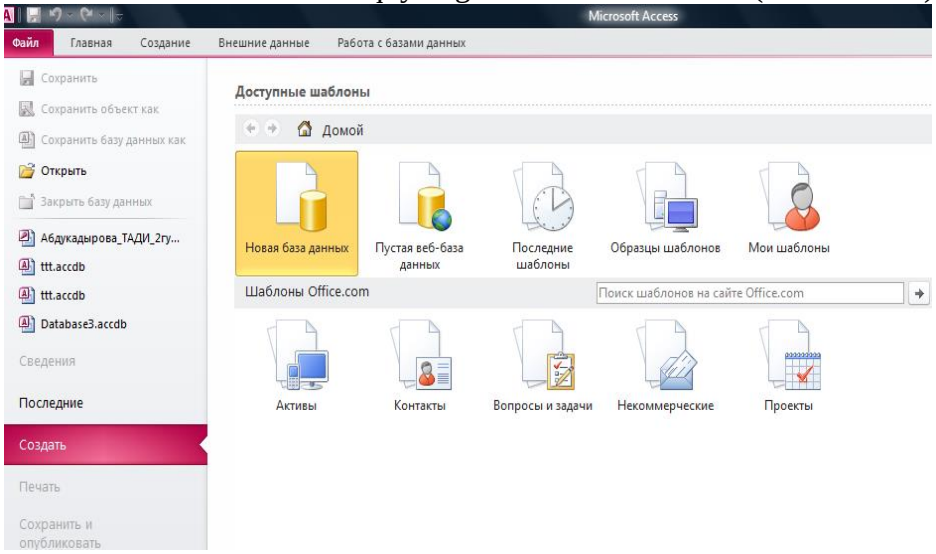
Topshiriqlar:
1. Ma’lumotlar bazasini kompyuterda loyihalash asoslari o‘rganing.
2. Berilgan mavzu boyicha ma’lumotlar bazasini Accessda loyihalang.
3. Accessda berilgan topshiriq varianti boyicha loyiha tuzing va uni kompyuterga kiriting.
4. Ish bo‘yicha hisobot tayyorlang.

Nazariy qism:

Access Ma’lumotlar bazasini boshqarish tizimi interfeysi.
MS Access dasturini ishga tushirish uchun:

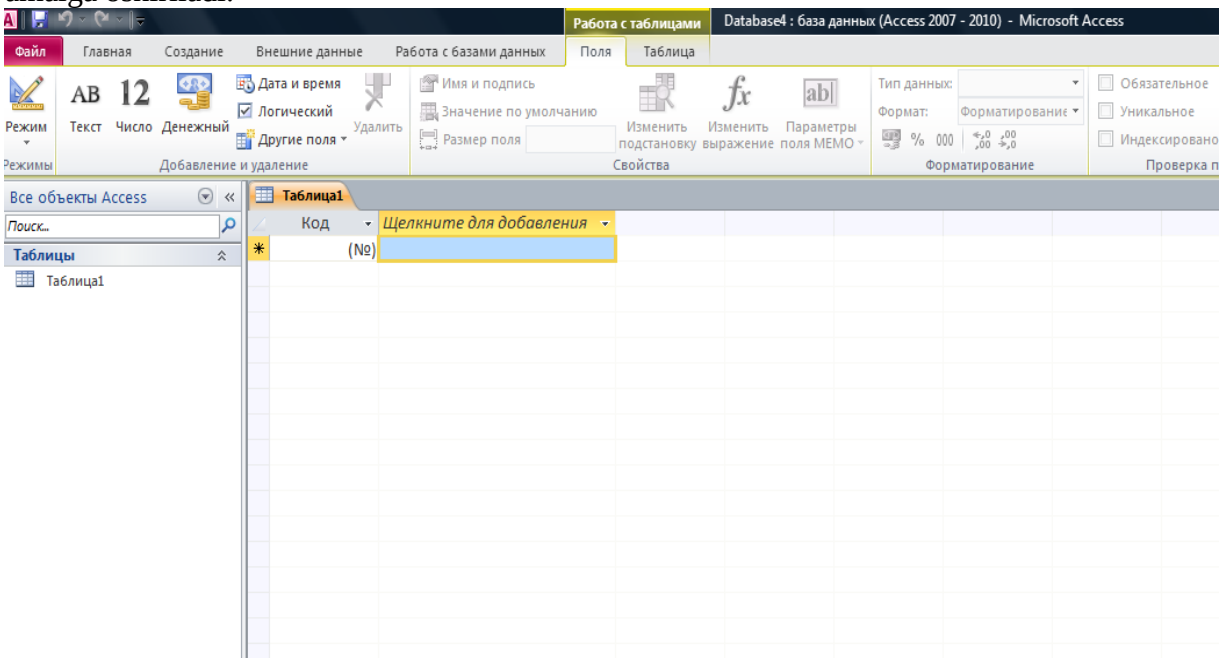
1. Пуск / Программы / Microsoft Office / Microsoft Access
2. Пуск / Документы / MS Accessga doir biror xujjatni ochib unda o‘zimizga yangi baza yaratamiz
3. Windows ishchi stolidagi Microsoft Access ilova dasturi piktogrammasini tanlaymiz va h.

MS Access dasturi darchasi quyidagi ko‘rinishda ochiladi (10.4.1- rasm) :

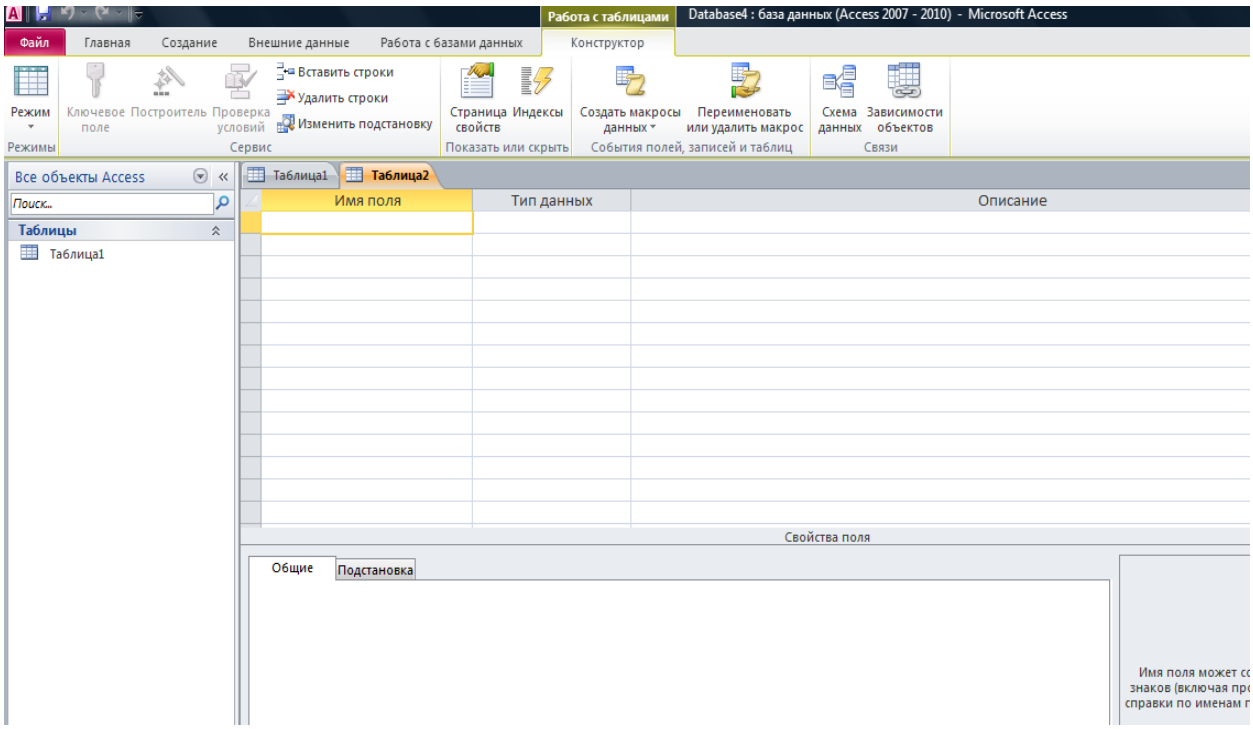


Rasm2.1.

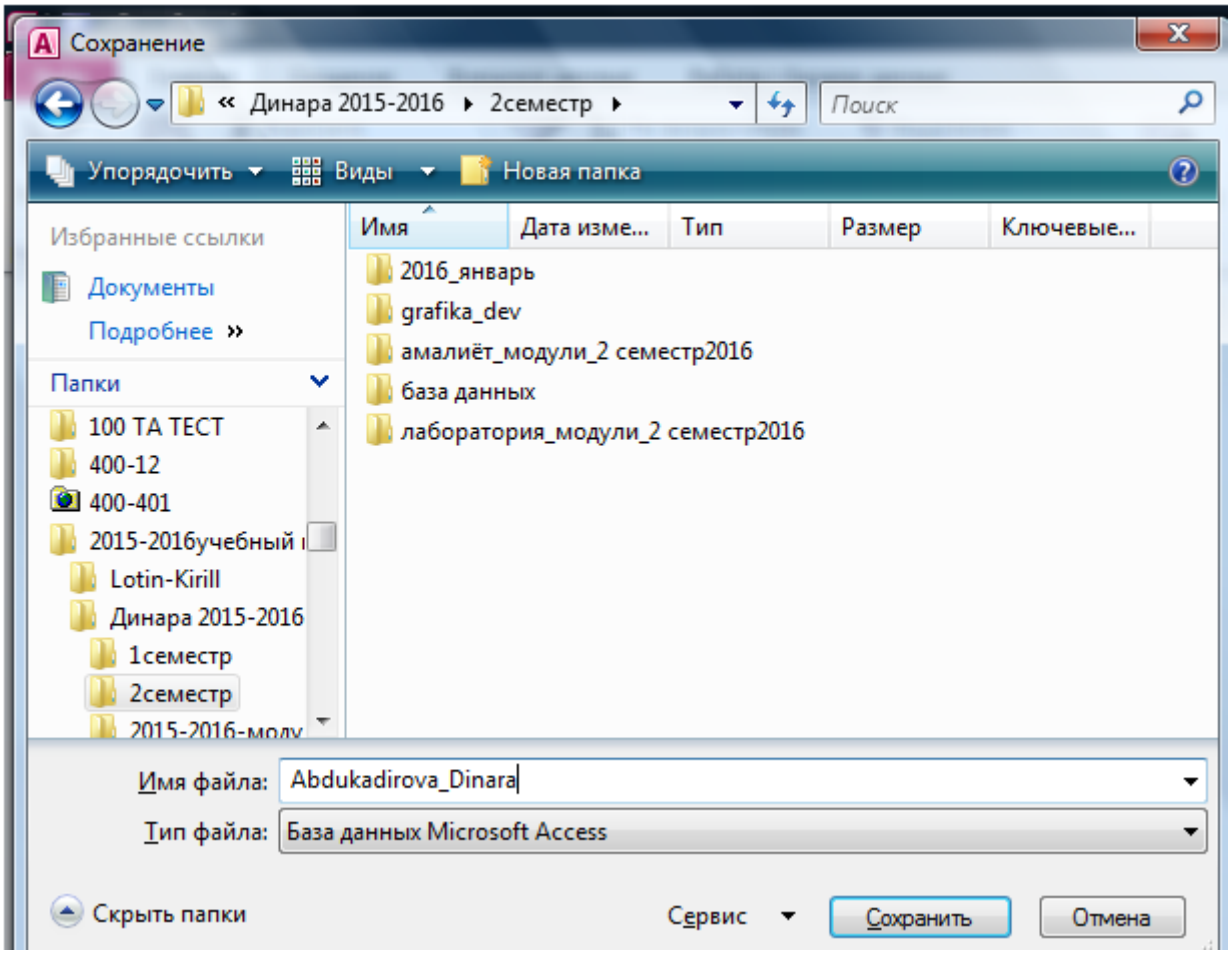
Dastur ishini yakunlash uchun **Файл** menyusidagi **Выход** buyrug‘ini yoki darchaning o‘ng-yuqori burchagidagi **Закрыт** tugmasiga bosamiz.
Foydalanuvchining Access Ma’lumotlar ombori bilan ishlash MBBT darchasida (2- rasm) amalga oshiriladi.



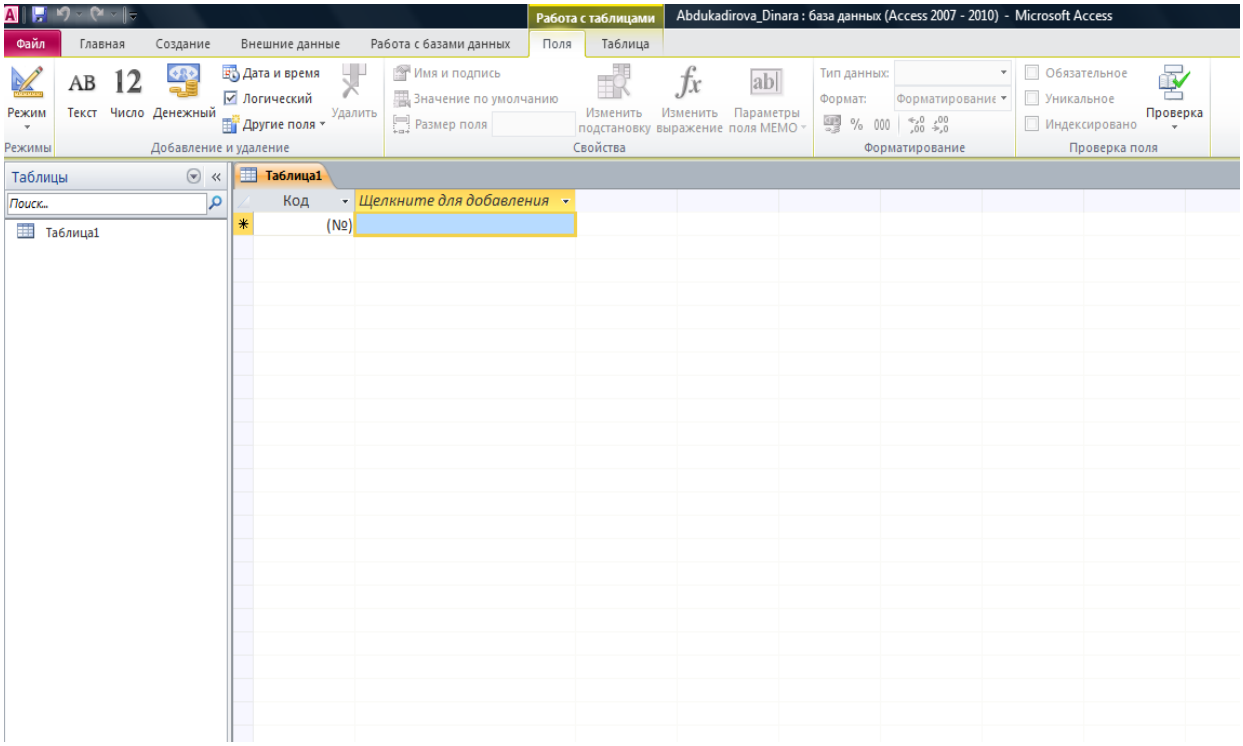
Rasm 2.2.



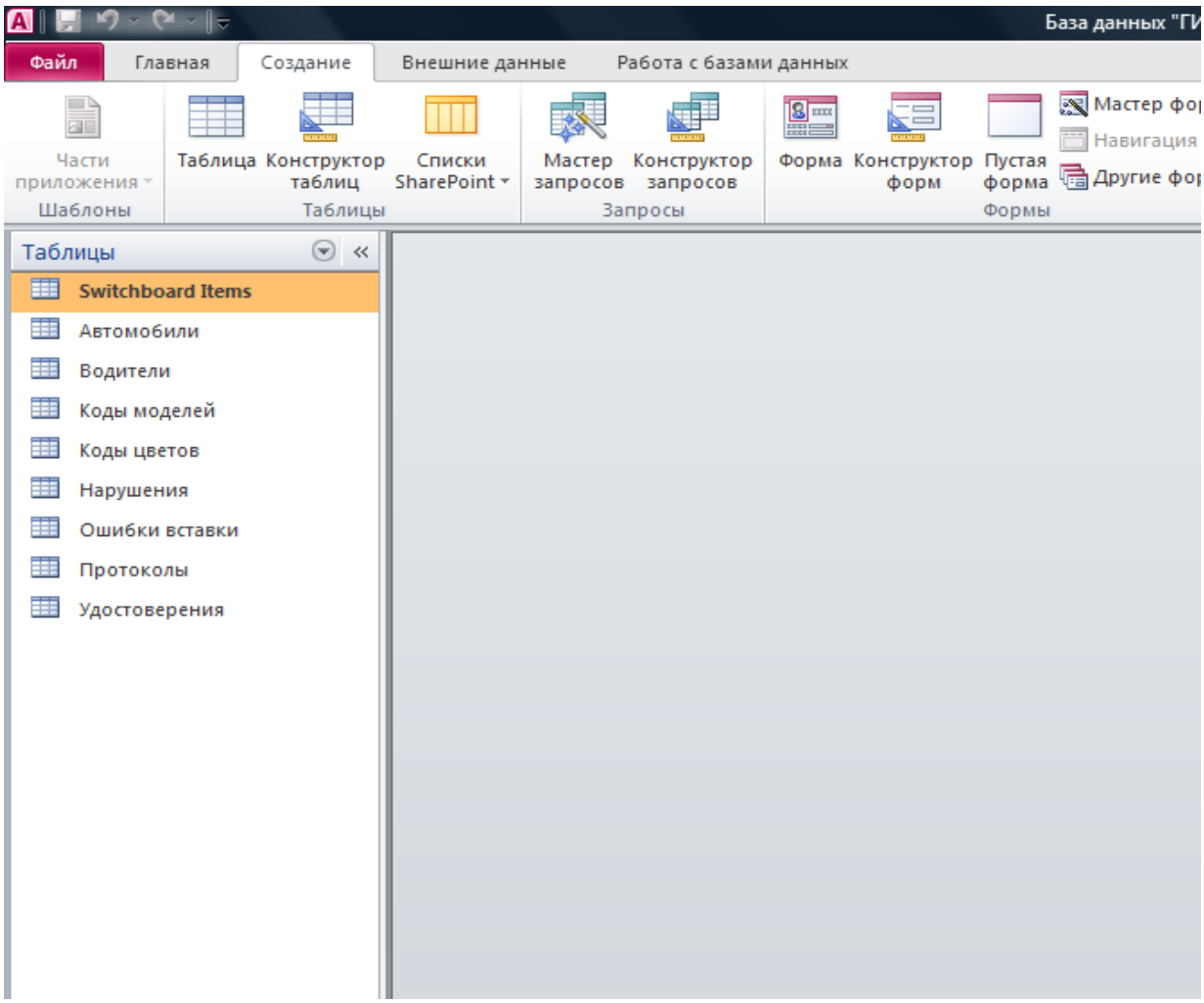
Rasm2.3.



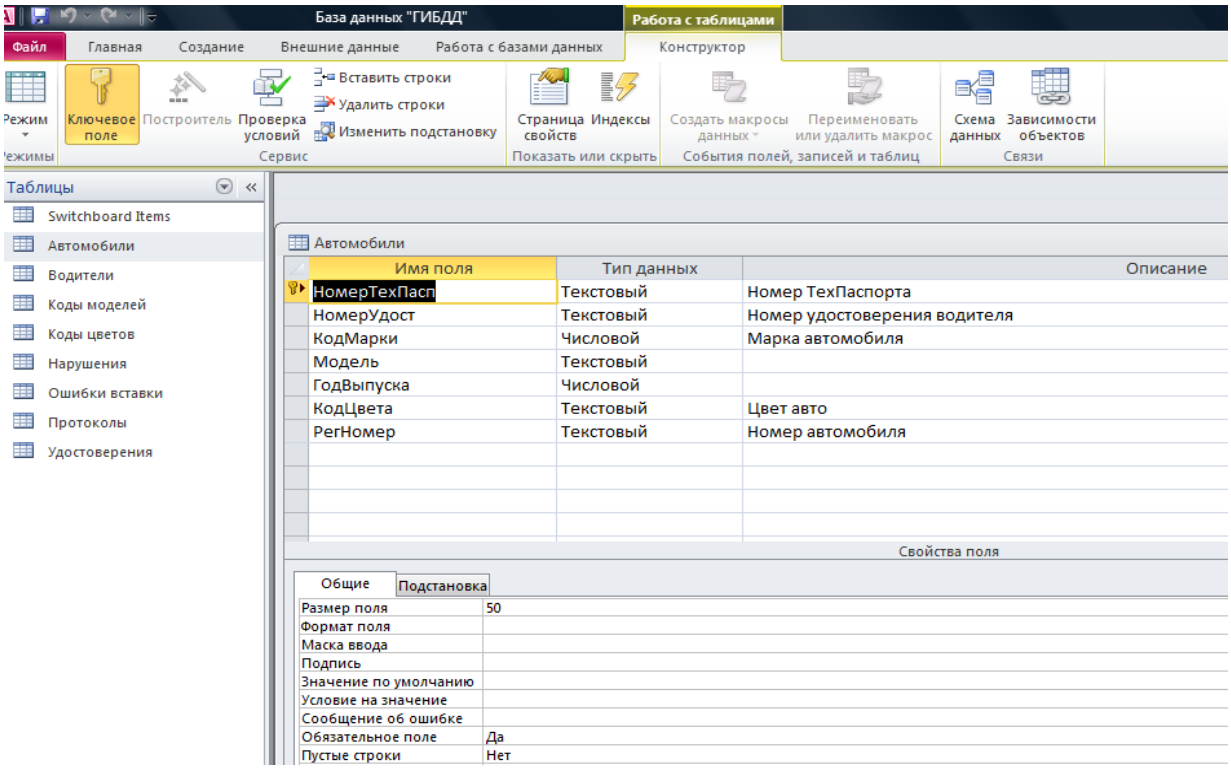
Rasm2.4.



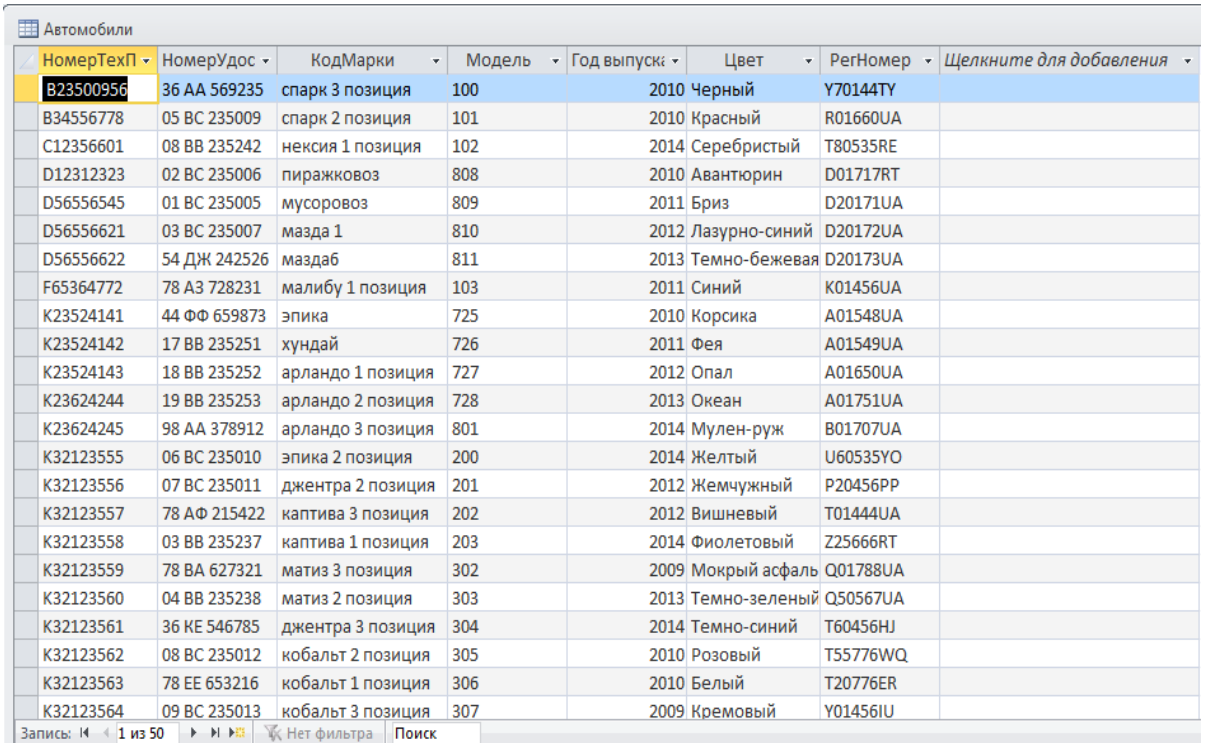
Rasm2.5.



Rasm2.6.



Rasm2.7.



Автомобили

НомерТехП	НомерУдос	КодМарки	Модель	Год выпуска	Цвет	РегНомер	Щелкните для добавления
B23500956	36 AA 569235	спарк 3 позиция	100	2010	Черный	Y70144TY	
B34556778	05 BC 235009	спарк 2 позиция	101	2010	Красный	R01660UA	
C12356601	08 BB 235242	нексия 1 позиция	102	2014	Серебристый	T80535RE	
D12312323	02 BC 235006	пиражковоз	808	2010	Авантюрин	D01717RT	
D56556545	01 BC 235005	мусоровоз	809	2011	Бриз	D20171UA	
D56556621	03 BC 235007	мазда 1	810	2012	Лазурно-синий	D20172UA	
D56556622	54 ДЖ 242526	маздаб	811	2013	Темно-бежевая	D20173UA	
F65364772	78 A3 728231	малибу 1 позиция	103	2011	Синий	K01456UA	
K23524141	44 ФФ 659873	эпика	725	2010	Корсика	A01548UA	
K23524142	17 BB 235251	хундай	726	2011	Фея	A01549UA	
K23524143	18 BB 235252	арландо 1 позиция	727	2012	Опал	A01650UA	
K23624244	19 BB 235253	арландо 2 позиция	728	2013	Океан	A01751UA	
K23624245	98 AA 378912	арландо 3 позиция	801	2014	Мулен-руж	B01707UA	
K32123555	06 BC 235010	эпика 2 позиция	200	2014	Желтый	U60535YO	
K32123556	07 BC 235011	джентра 2 позиция	201	2012	Жемчужный	P20456PP	
K32123557	78 АФ 215422	каптива 3 позиция	202	2012	Вишневый	T01444UA	
K32123558	03 BB 235237	каптива 1 позиция	203	2014	Фиолетовый	Z25666RT	
K32123559	78 BA 627321	матиз 3 позиция	302	2009	Мокрый асфаль	Q01788UA	
K32123560	04 BB 235238	матиз 2 позиция	303	2013	Темно-зеленый	Q50567UA	
K32123561	36 KE 546785	джентра 3 позиция	304	2014	Темно-синий	T60456HJ	
K32123562	08 BC 235012	кобальт 2 позиция	305	2010	Розовый	T55776WQ	
K32123563	78 EE 653216	кобальт 1 позиция	306	2010	Белый	T20776ER	
K32123564	09 BC 235013	кобальт 3 позиция	307	2009	Кремовый	Y01456IU	

Запись: 1 из 50 | Нет фильтра | Поиск

Rasm2.8.

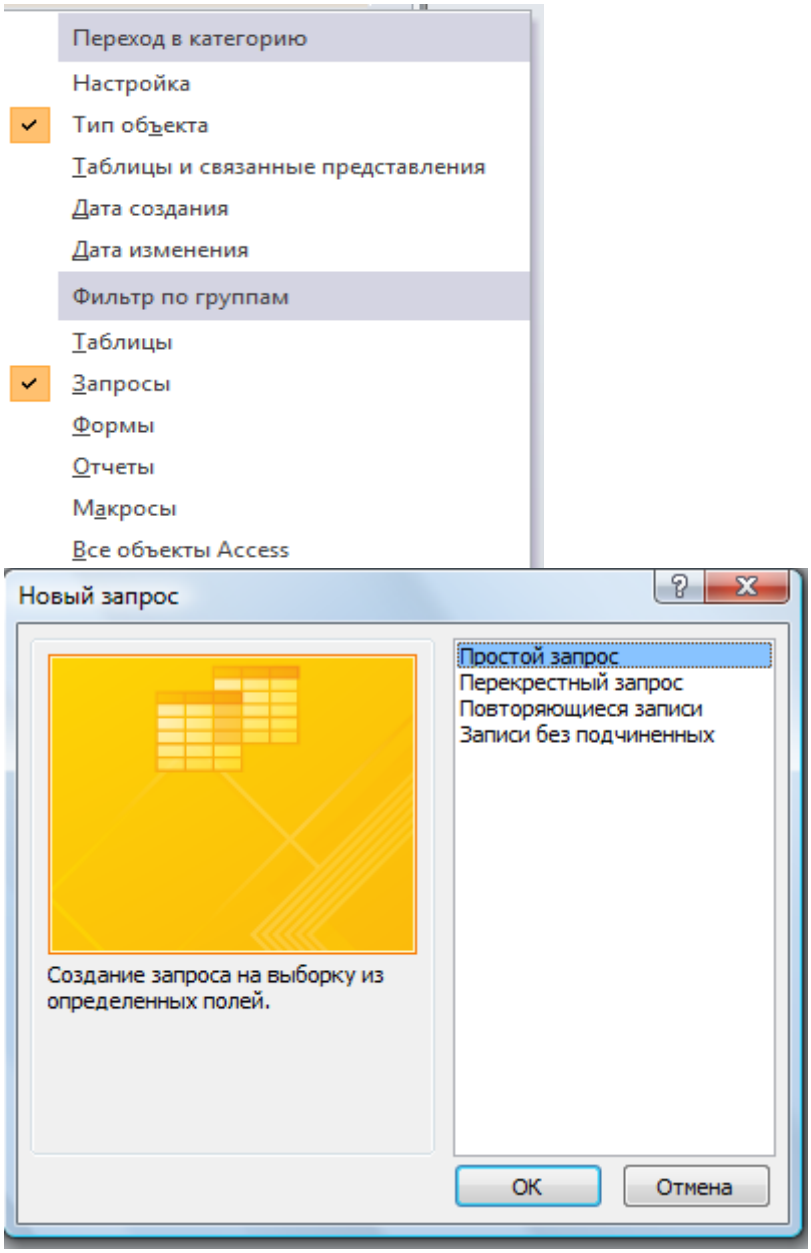
2-2 - LABORATORIYA ISHI
ACCESSDA SQL TILIDA SO‘ROV YARATISH.

Maqsad: Ma’lumotlar bazasi Accessda SQL tilida so‘rovnoma yaratish. Berilgan mavzu boyicha Accessda konstruktor rejimi orqali so‘rovnomalarni SQL tilidagi bo‘yruqlarga utish va so‘rovnomani natijasini ekranga chiqarish.

Topshiriqlar:

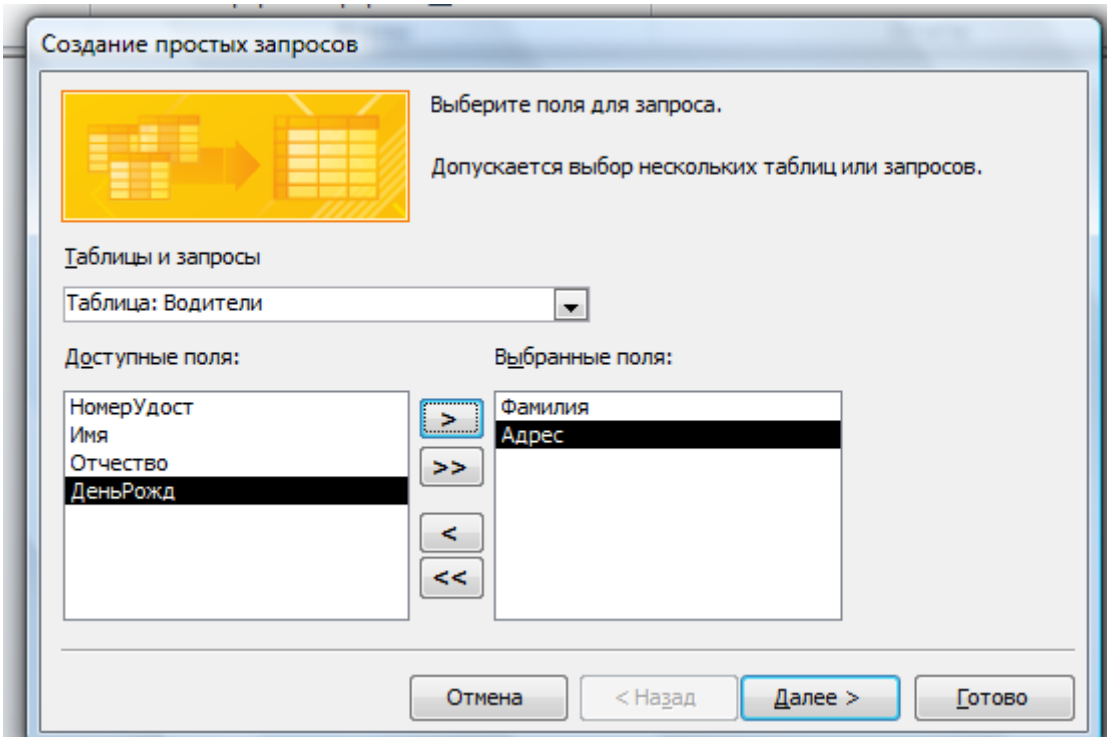
1. Ma’lumotlar bazasida so‘rovnomalarni tashkil qilishni o‘rganish.
2. Berilgan mavzu boyicha Accessda SQL tilida so‘rovnomalar yarating.
3. Accessda berilgan topshiriq Topshiriqi boyicha so‘rovnoma tuzing va uni kompyuterga kiriting.
4. Ish bo‘yicha hisobot tayyorlang.

Misol 1. Мастер запросов (so‘rovnoma ustasi) orqali oddiy so‘rov malumot bazasidan, jadvallardan foydalanib yarating



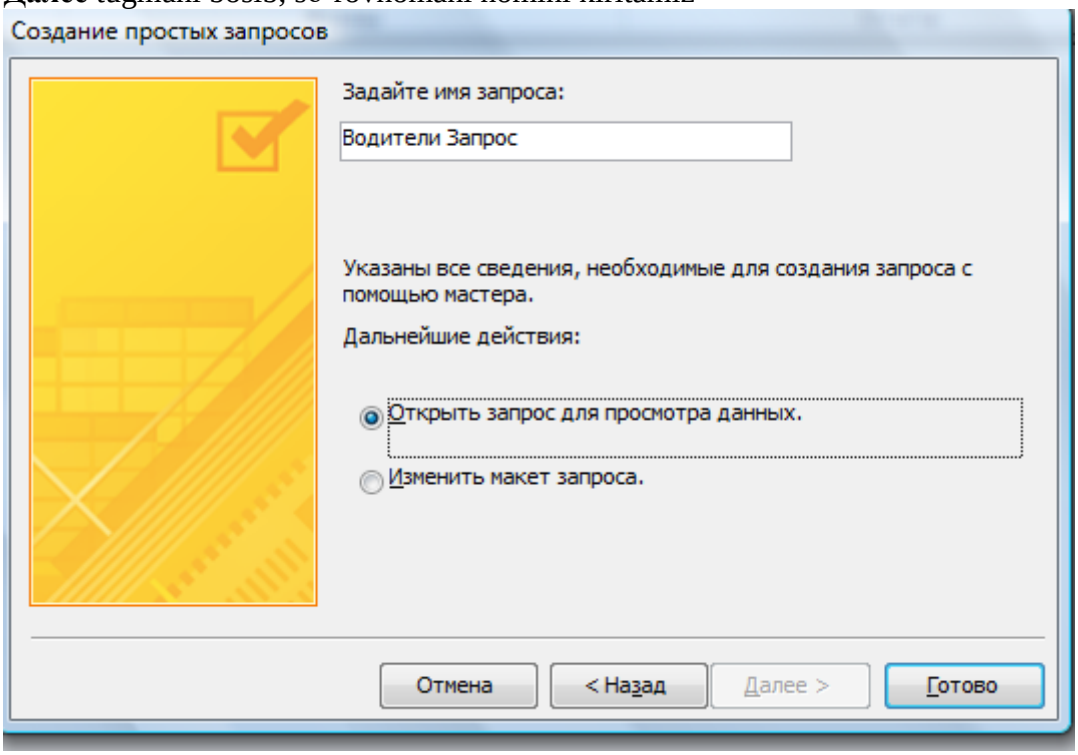
Rasm 2.9.

Простой запрос (oddiy so‘rovnomani) bo‘limini tanlab, Ok tugmani bosib, so‘ng **Водители** jadvalni belgilab uni ichidan ikkita maydoni belgilaymiz.



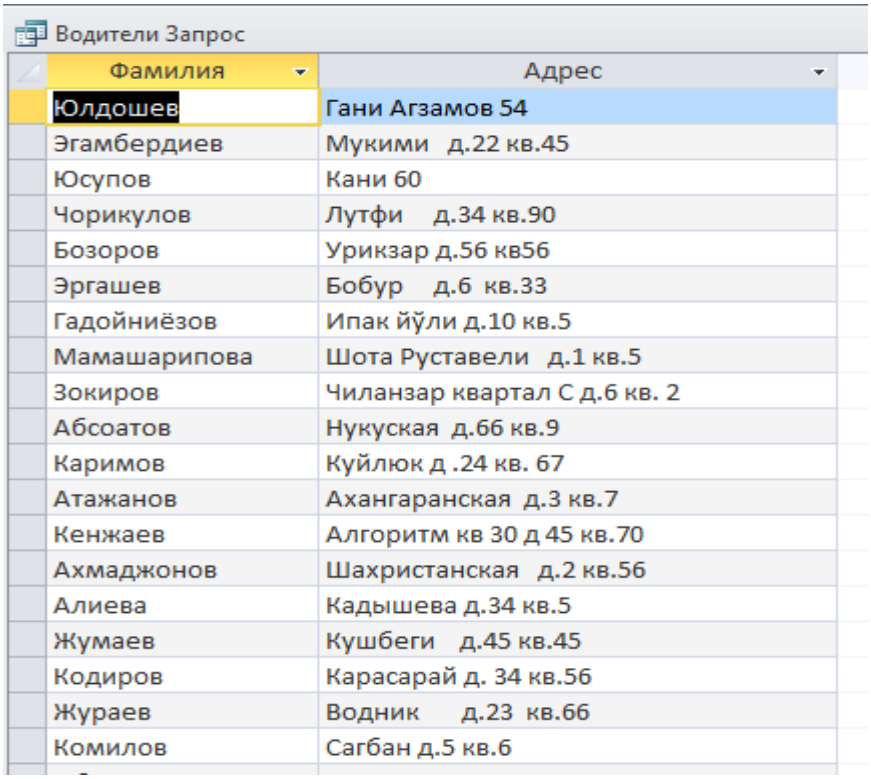
Rasm 2.10.

Далее tugmani bosib, so‘rovnomani nomini kiritamiz



Rasm2.11.

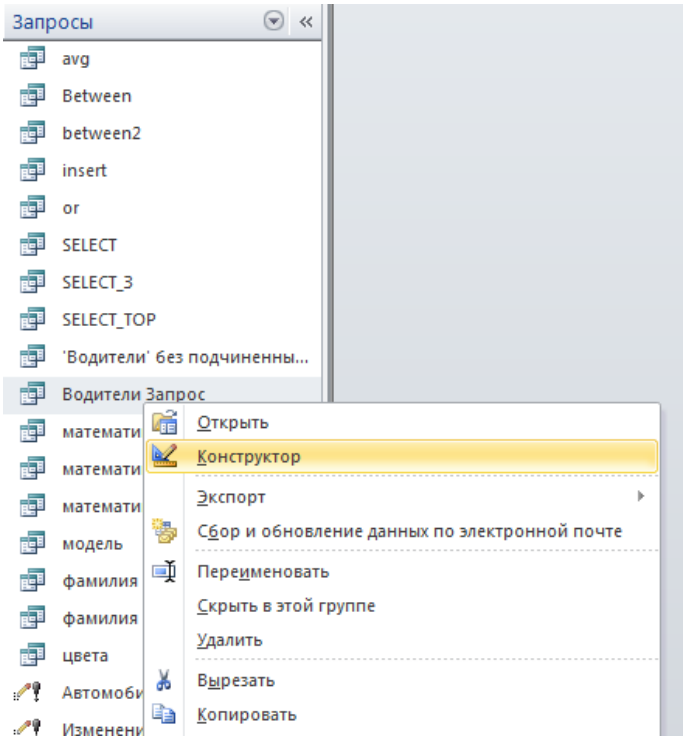
Открыт bo‘yrug‘ini belgilab olamiz va **Готово** ni bosamiz. Natijada talan qilingan so‘rov ochiladi.



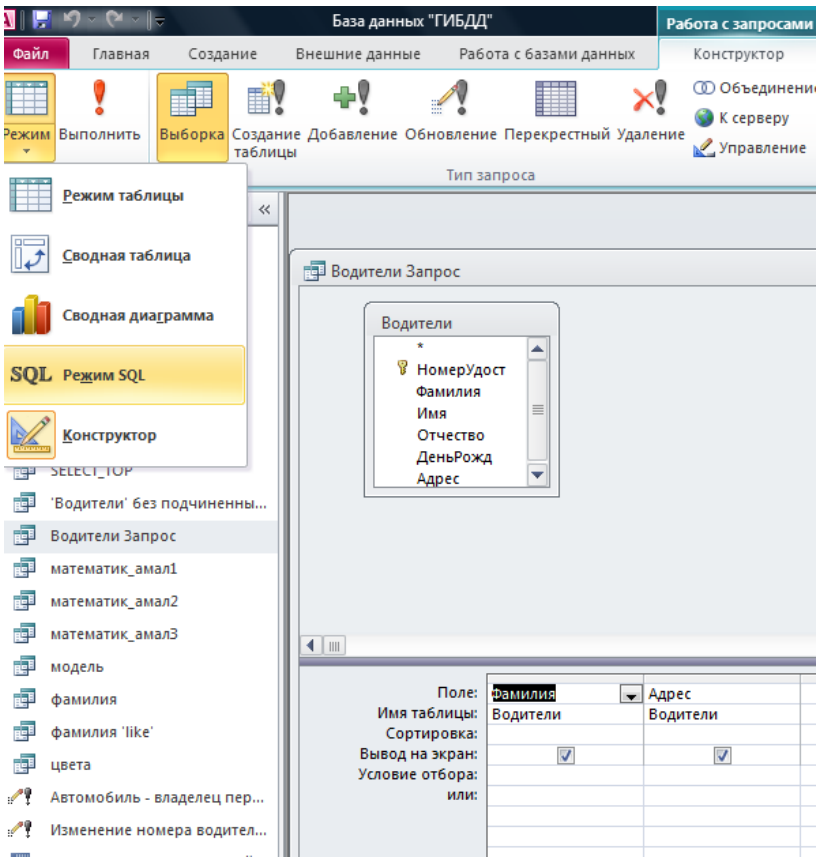
Водители Запрос

Фамилия	Адрес
Юлдошев	Гани Агзамов 54
Эгамбердиев	Мукими д.22 кв.45
Юсупов	Кани 60
Чорикулов	Лутфи д.34 кв.90
Бозоров	Урикзар д.56 кв56
Эргашев	Бобур д.6 кв.33
Гадойниёзов	Ипак йўли д.10 кв.5
Мамашарипова	Шота Руставели д.1 кв.5
Зокиров	Чиланзар квартал С д.6 кв. 2
Абсоатов	Нукуская д.66 кв.9
Каримов	Куйлюк д .24 кв. 67
Атажанов	Ахангаранская д.3 кв.7
Кенжаев	Алгоритм кв 30 д 45 кв.70
Ахмаджонов	Шахристанская д.2 кв.56
Алиева	Кадышева д.34 кв.5
Жумаев	Кушбеги д.45 кв.45
Кодиров	Карасарай д. 34 кв.56
Жураев	Водник д.23 кв.66
Комилов	Сагбан д.5 кв.6

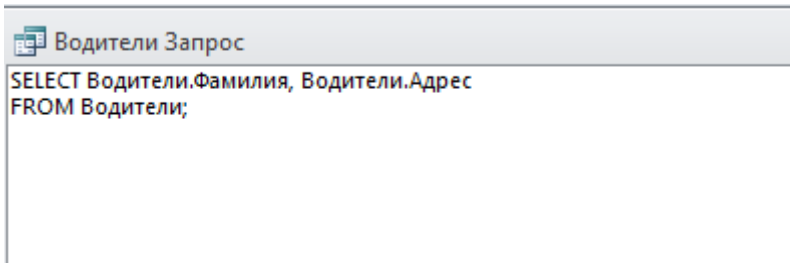
Rasm2.12.



Rasm2.13.

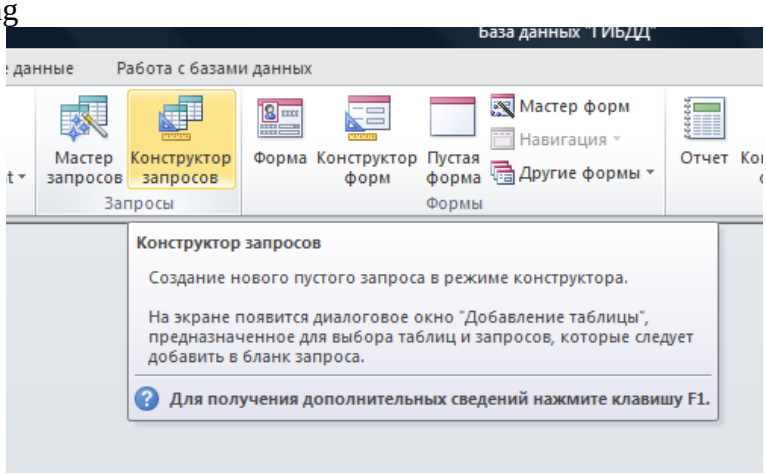


Rasm2.14.



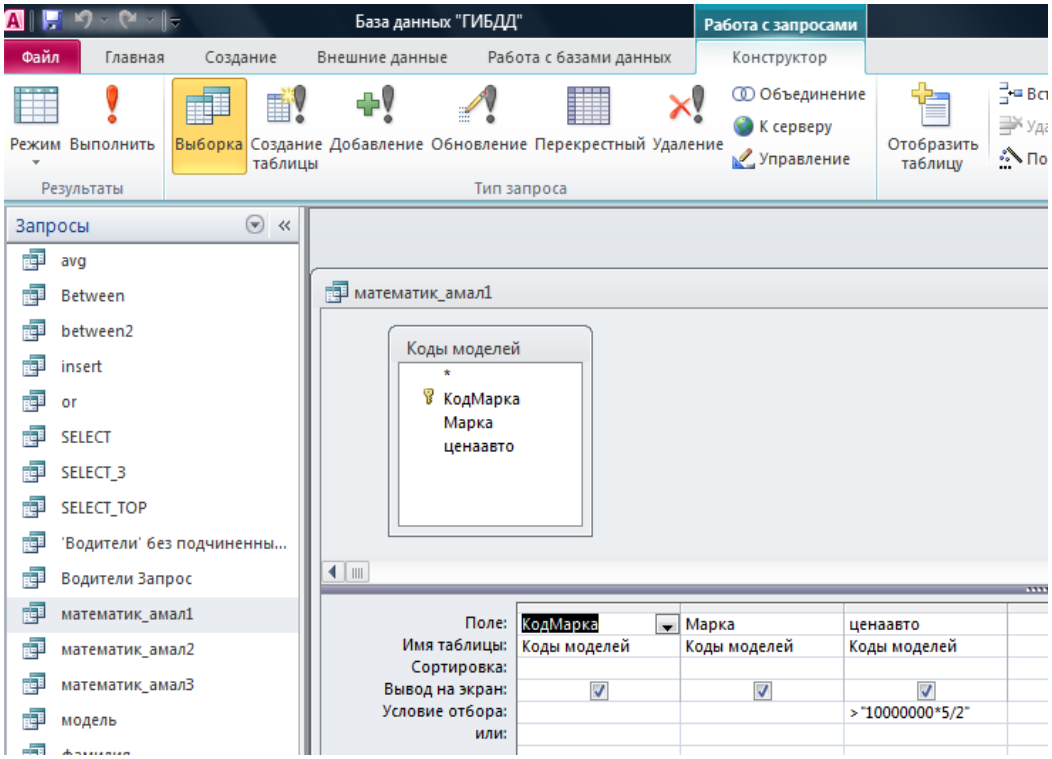
Rasm2.15.

Misol 2. Конструктор запросов matematik _amal1 so‘rovni **коды моделей** jadvalidan foydalanib yarating

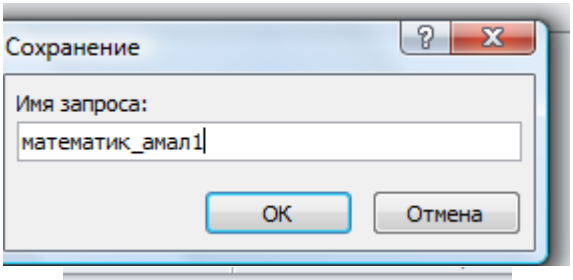


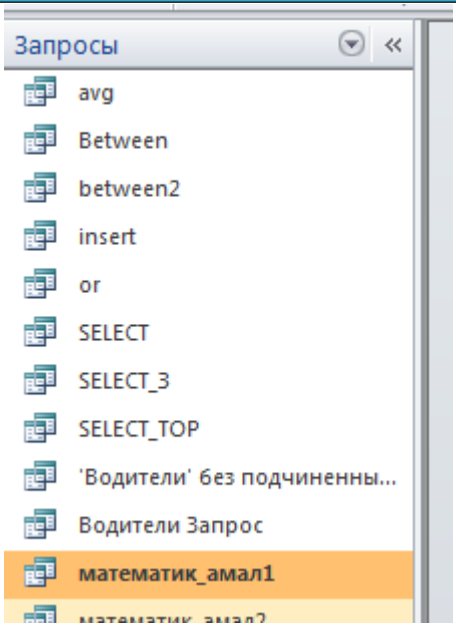
Rasm 2.16.

Конструктор rejimida qo‘rinish quyidagicha



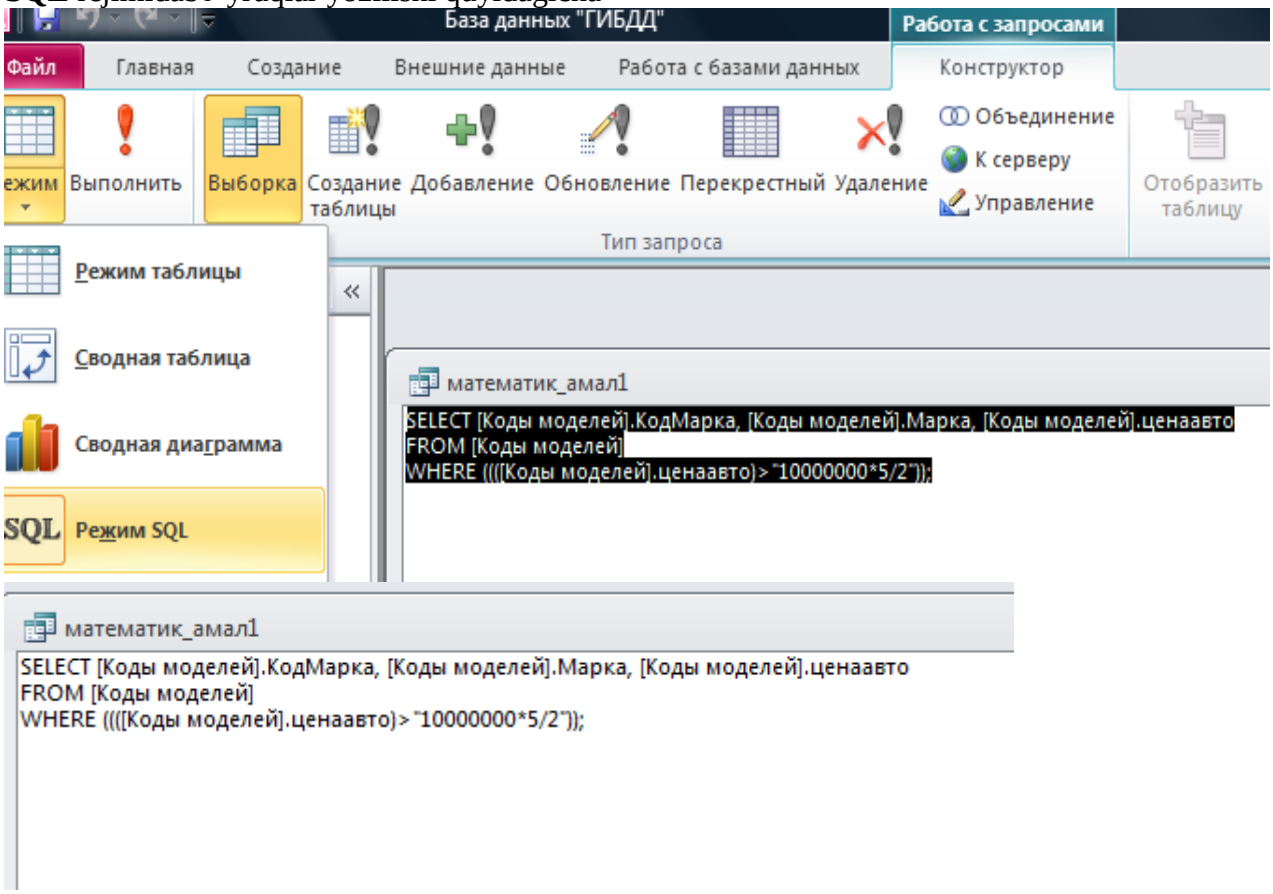
Rasm 2.17.





Rasm2.18.

SQL rejimidabo‘yruqlar yozilishi quyidagicha



Rasm2.19.

Va oxirida so‘rovnomani natijasi

математик_амал1

КодМарка	Марка	ценаавто
1	спарк 3 позиция	24000000
2	спарк 2 позиция	20000000
3	нексия 1 позиция	25000000
4	малибу 1 позиция	40000000
5	эпика 2 позиция	50000000
6	джентра 2 позиция	60000000
7	каптива 3 позиция	70000000
8	каптива 1 позиция	65000000
9	матиз 3 позиция	15000000
10	матиз 2 позиция	12000000
11	джентра 3 позиция	26000000
12	кобальт 2 позиция	23000000
13	кобальт 1 позиция	20000000
14	кобальт 3 позиция	21000000
15	дамас 1 позиция	19000000
16	дамас 2 позиция	19500000
17	дамас 3 позиция	22000000
18	дамас 4 позиция	23000000
19	нексия 1 позиция	23000000

Rasm2.20.

3 - LABORATORIYA ISHI.
ACCESS2010DA SHAKLLAR YARATISH. MS ACCESS2010DA HISOBOTLAR YARATISH.

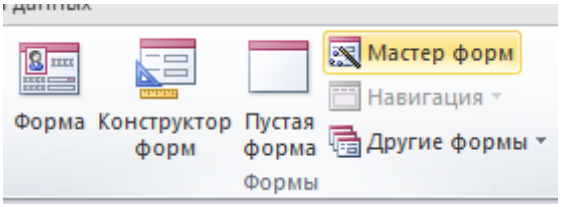
Ishdan maqsad. Ma'lumotlarni kiritish uchun maydonlarga ega bo'lgan electron blankani shakllarni va xisoblarni yaratishning turli usullari bilan tanishish.

Topshiriqlar:
1. 3 usul bilan shakl yaratish.
2. 3 usul bilan xisobot yaratish.
3. Ma'lumotlar bazasida xisobotni chop etishga tayorlash.

Nazariy qism

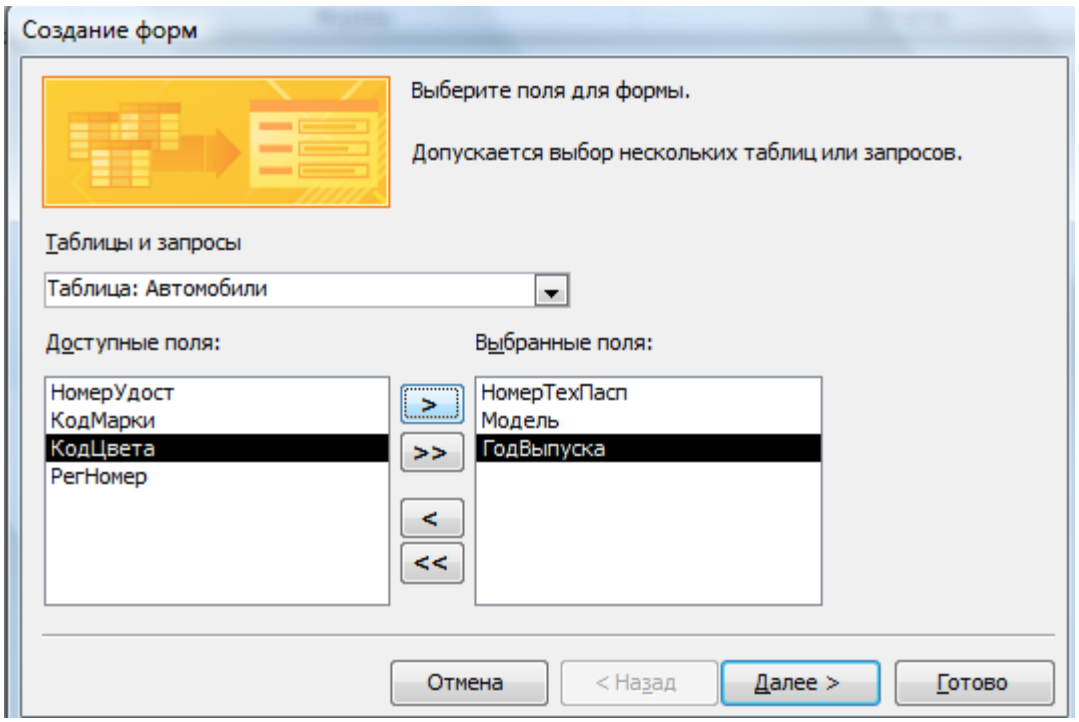
Shakl (Forma) – MBga yangi ma'lumotlar kiritadi, yoki joriy MBdagi ma'lumotlar ustida foydalanuvchi uchun kulay bo'lgan turli-tuman shakldagi formalar yaratadi. Demak, forma – ekran ob'ekti bo'lib, elektron blank tarzida ifodalanib, unda ma'lumotlar kiritiladigan maydon mavjud va shu maydonlarga kerakli ma'lumotlar joylashtiriladi va jadval shu tarika xosil kilinadi.
Xisobot (Otchyot) - MBni tarkibidagi ma'lumotlardan keraklisini printerga chiqaruvchi qogozdagi asosiy xujjat.
1.Forma tuzilmasi.

Forma tuzilmasi 3 kismdan iborat:
-forma sarlavxasi,
-ma'lumotlar beriladigan joy,
-eslatmalar satri.
Boshkarish elementlari asosan ma'lumotlar beriladigan joyda ifodalangan buladi. Boshkarish elementlari tagida tasvirning foni joylashib, u formaning ishchi maydonini ifodalaydi. «Sichkoncha» ni surish bilan bu o'lchamni o'zgartiradi.

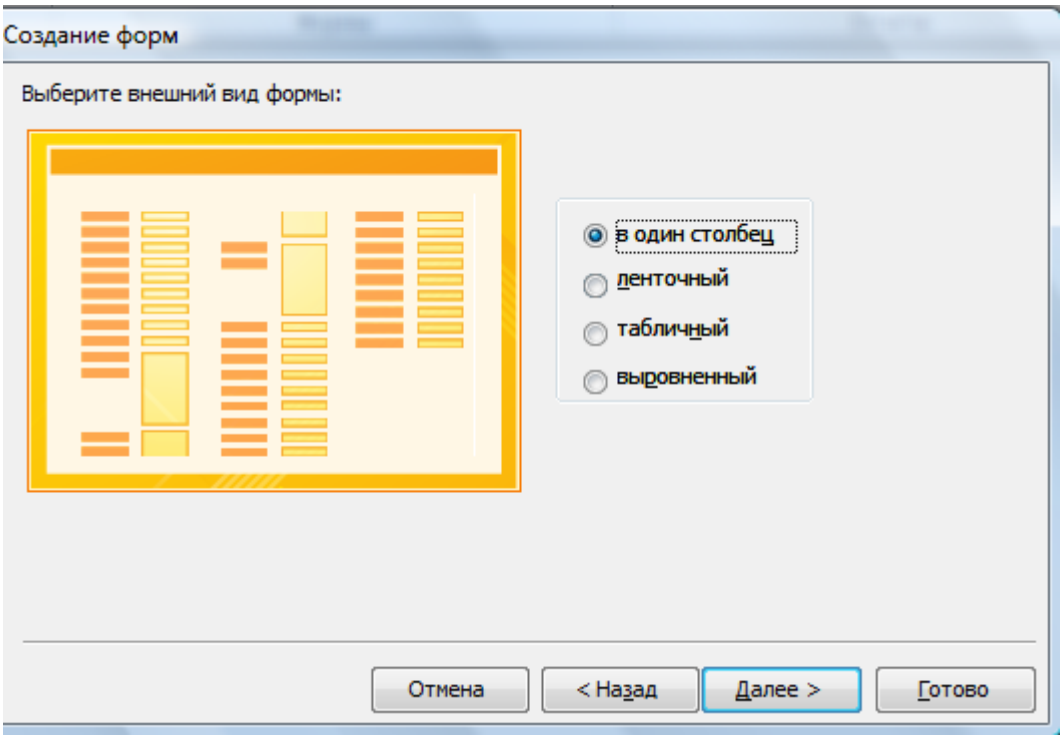


Rasm3.1.

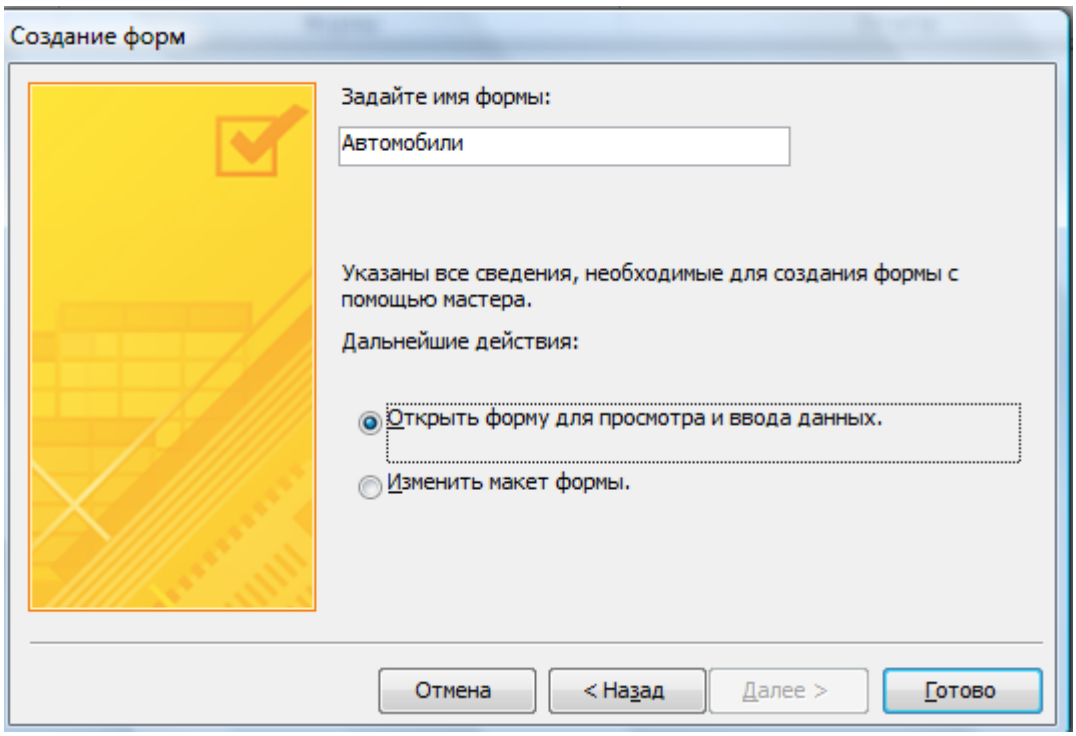
Misol 1. Shakllar ustasi yordamida.
Master form - tanlangan maydonlar asosida avtomatik ravishda formalar tuzish. Formalarni tuzish uchun uni tashkil kiladigan usullardan biri tanlab olingach, mulokot oynasining pastki kismida forma tuziluvchi jadval yoki surov nomi kursatiladi. Ma'lumki, forma asosan boshkarish elementlaridan iborat bulib, uning tashki kurinishi shu boshkarish elementlarini rejali joylashtirishga boglik.
Master yordamida forma tashkil kilish esa 4 etapdan iborat:
a) formaga kiritish mumkin bulgan maydonlarni tanlash,
v) formaning tashki kurinishini tanlash,
s) formaning fon tasvirini tanlash,
d) forma nomini berish.



Rasm3.2.



Rasm3.3.



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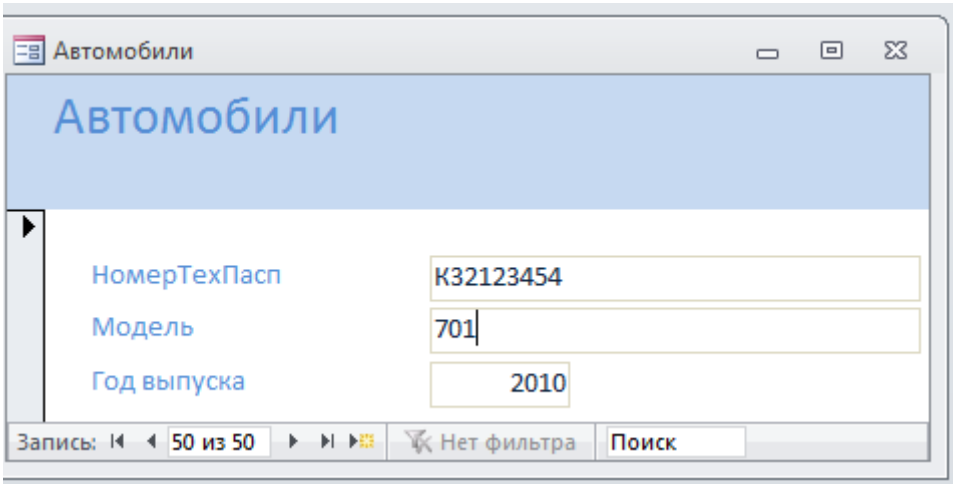
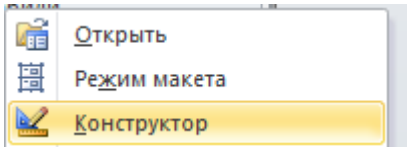
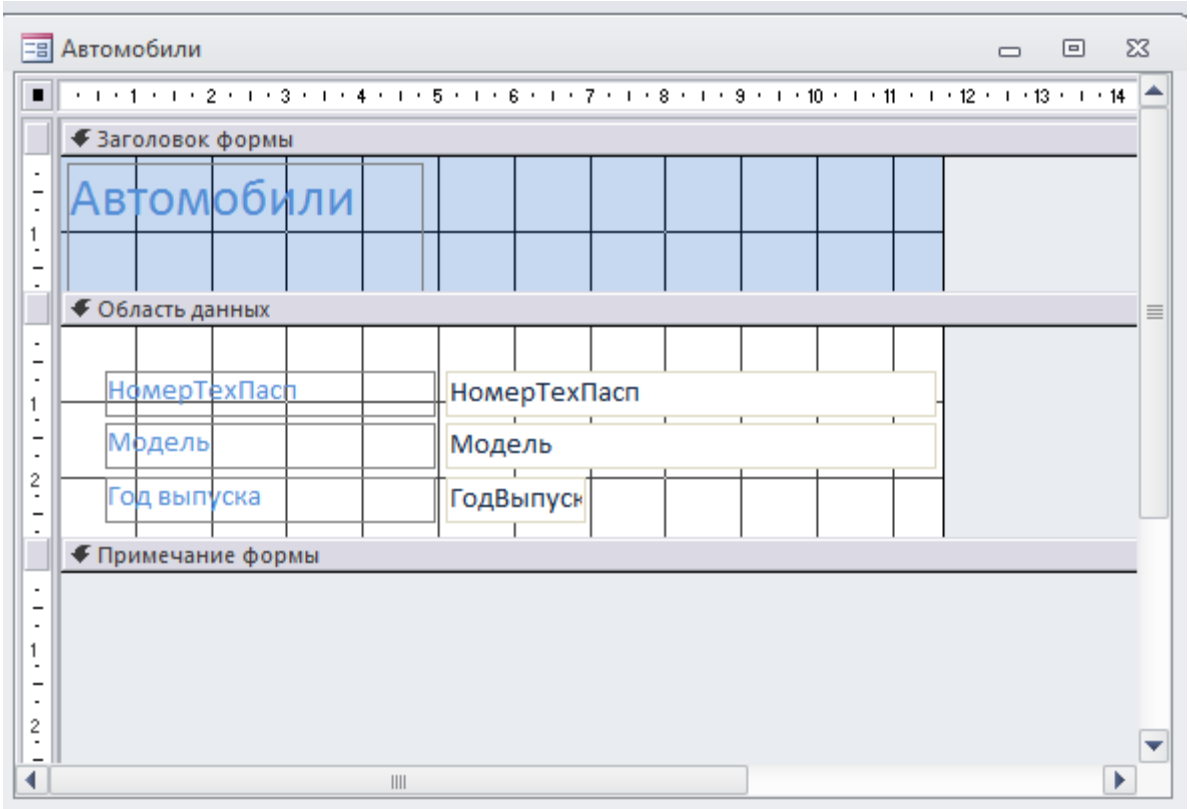


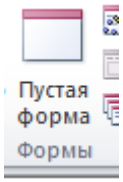
Rasm3.5.



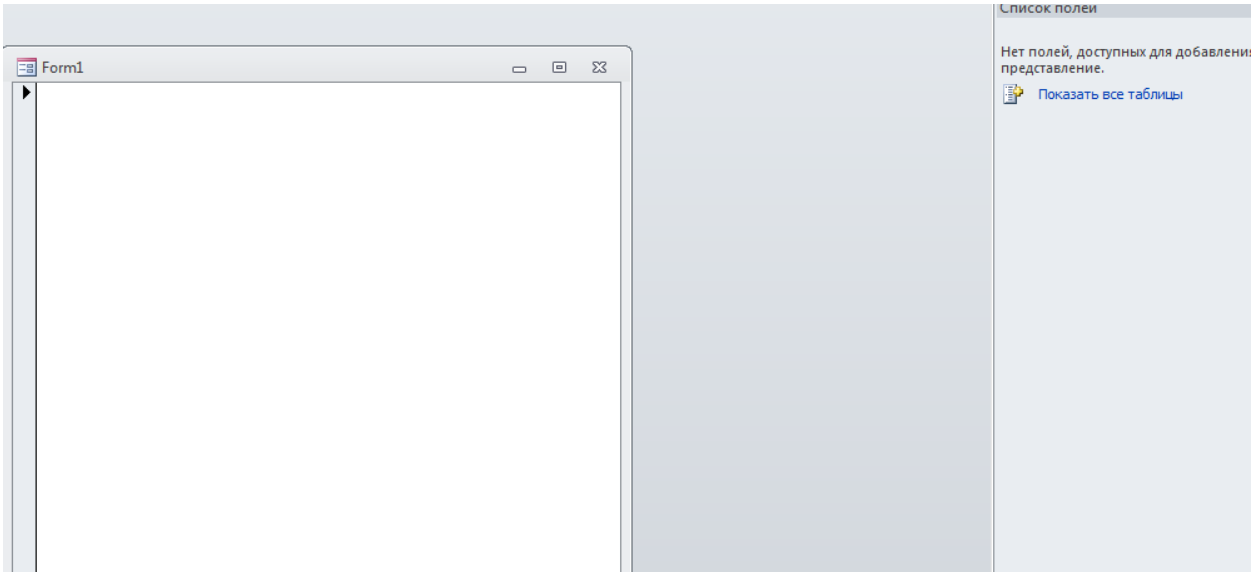
Rasm3.6.



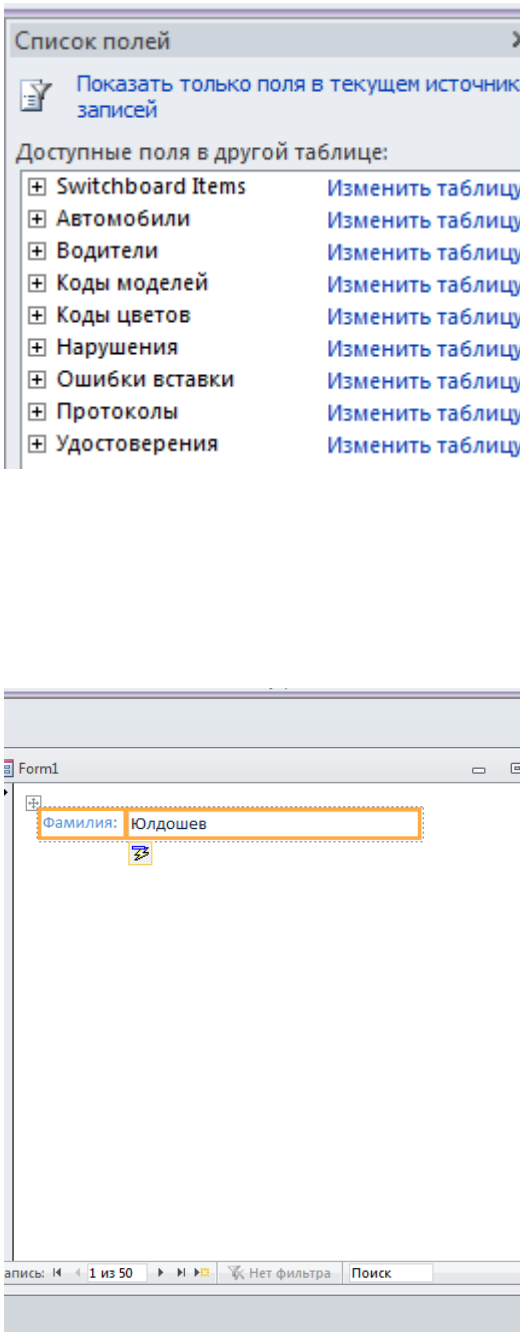
Rasm3.7.

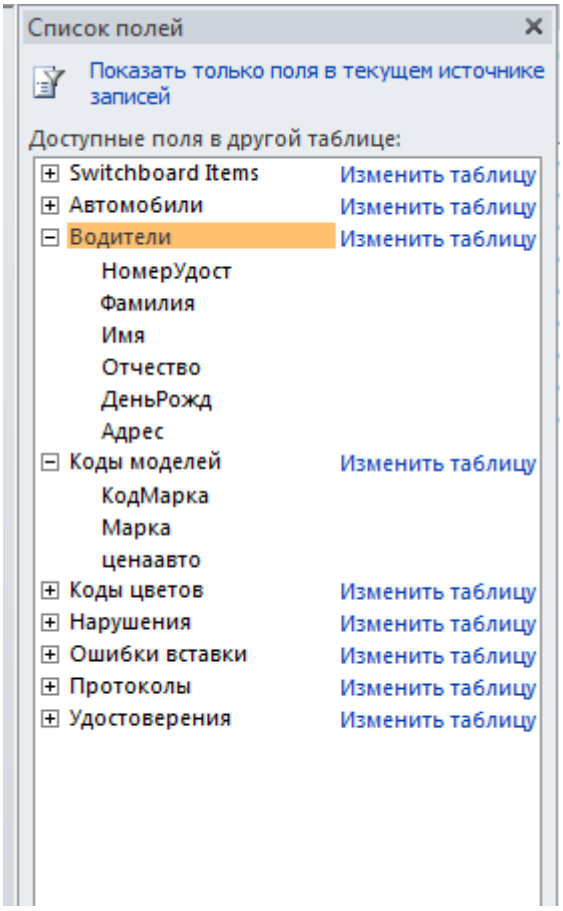
Misol 2. 

orqali yaratish.

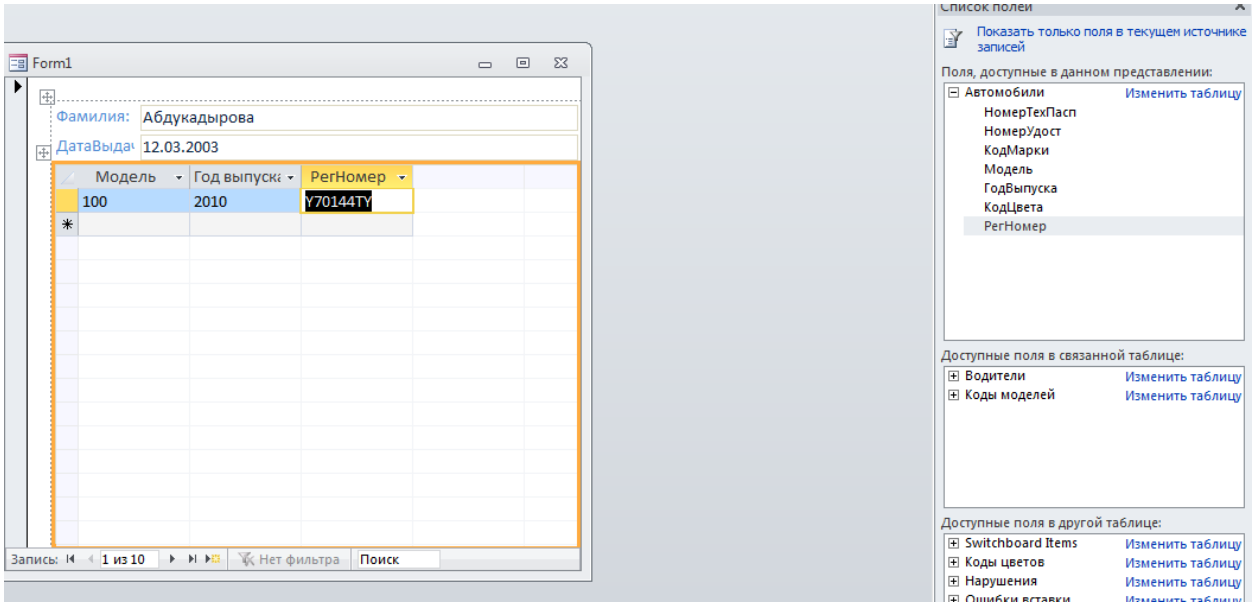


Rasm3.8.

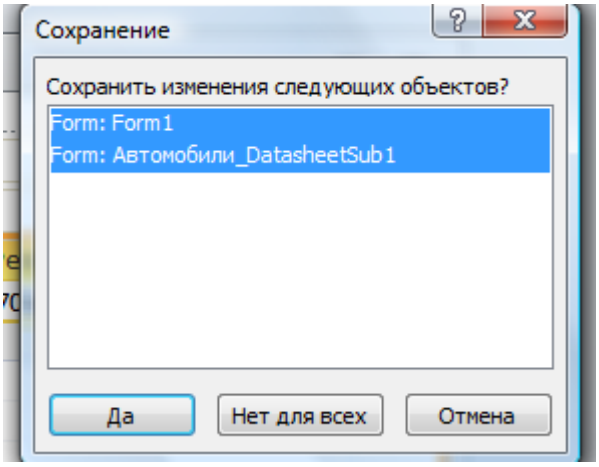

Список полей
Показать только поля в текущем источник записей
Доступные поля в другой таблице:
Switchboard Items Изменить таблицу
Автомобили Изменить таблицу
Водители Изменить таблицу
Коды моделей Изменить таблицу
Коды цветов Изменить таблицу
Нарушения Изменить таблицу
Ошибки вставки Изменить таблицу
Протоколы Изменить таблицу
Удостоверения Изменить таблицу
Form1
Фамилия: Юлдошев
1 из 50
Нет фильтра
Поиск


Список полей
Показать только поля в текущем источнике записей
Доступные поля в другой таблице:
Switchboard Items Изменить таблицу
Автомобили Изменить таблицу
Водители Изменить таблицу
НомерУдост
Фамилия
Имя
Отчество
ДеньРожд
Адрес
Коды моделей Изменить таблицу
КодМарка
Марка
ценаавто
Коды цветов Изменить таблицу
Нарушения Изменить таблицу
Ошибки вставки Изменить таблицу
Протоколы Изменить таблицу
Удостоверения Изменить таблицу

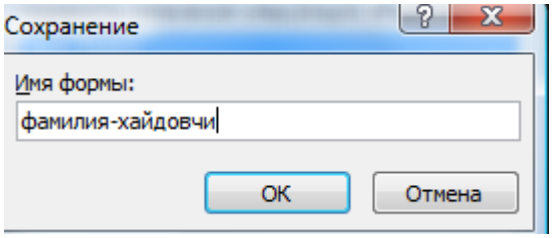
Rasm3.9.



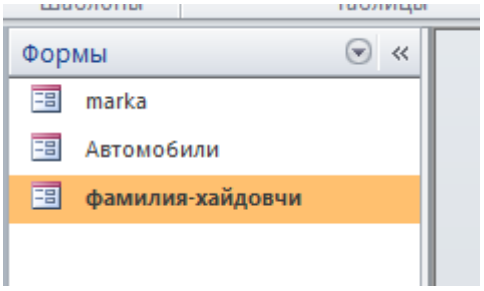
Rasm3.10.



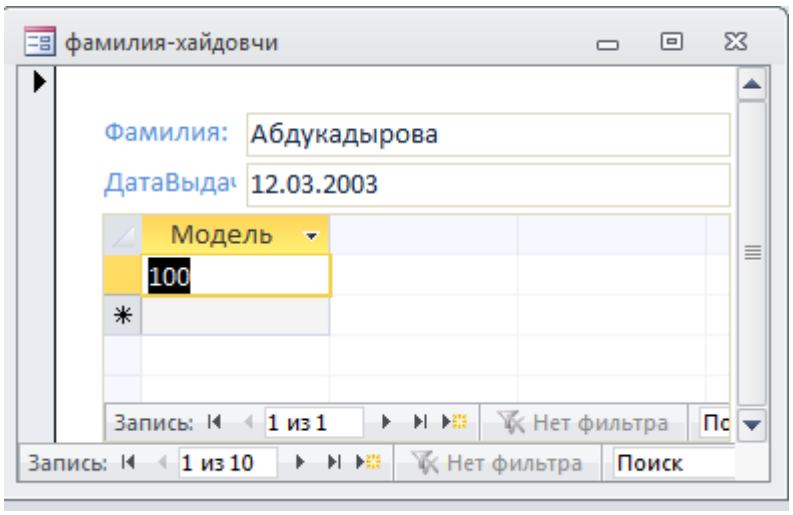
Rasm3.11.



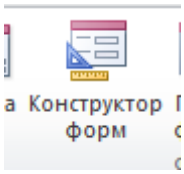
Rasm3.12.



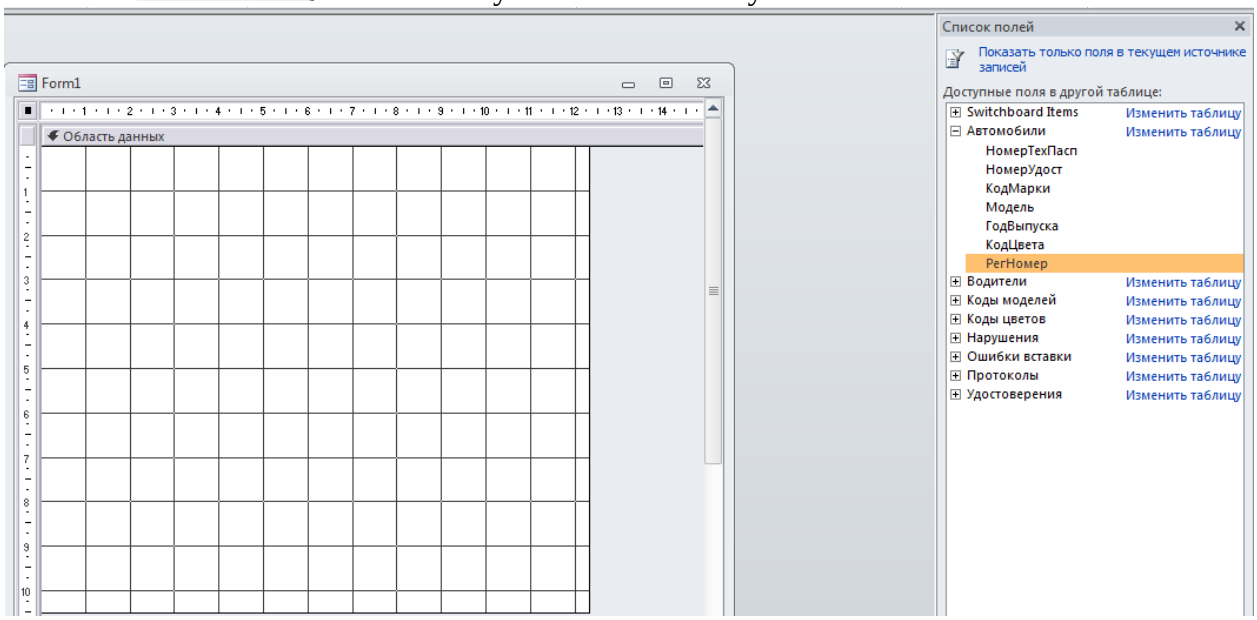
Rasm3.13.



Rasm3.14.



Misol 3. konstruktor yordamida shakllar yaratish.



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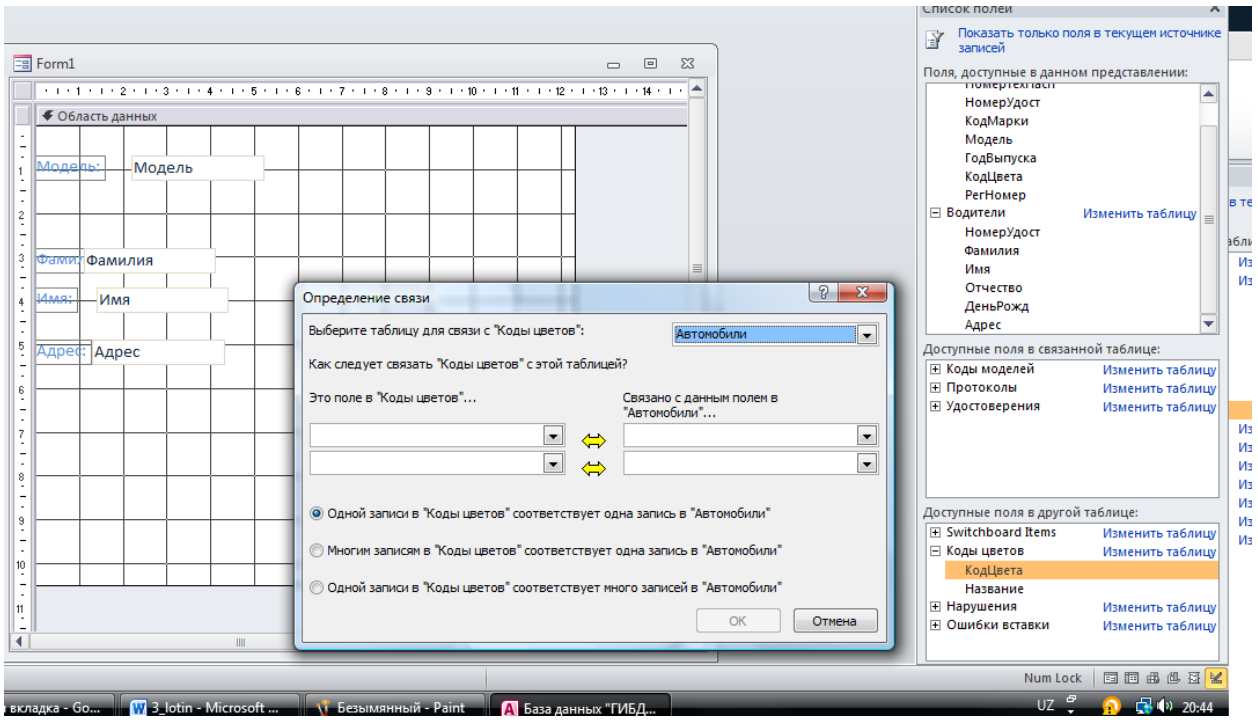
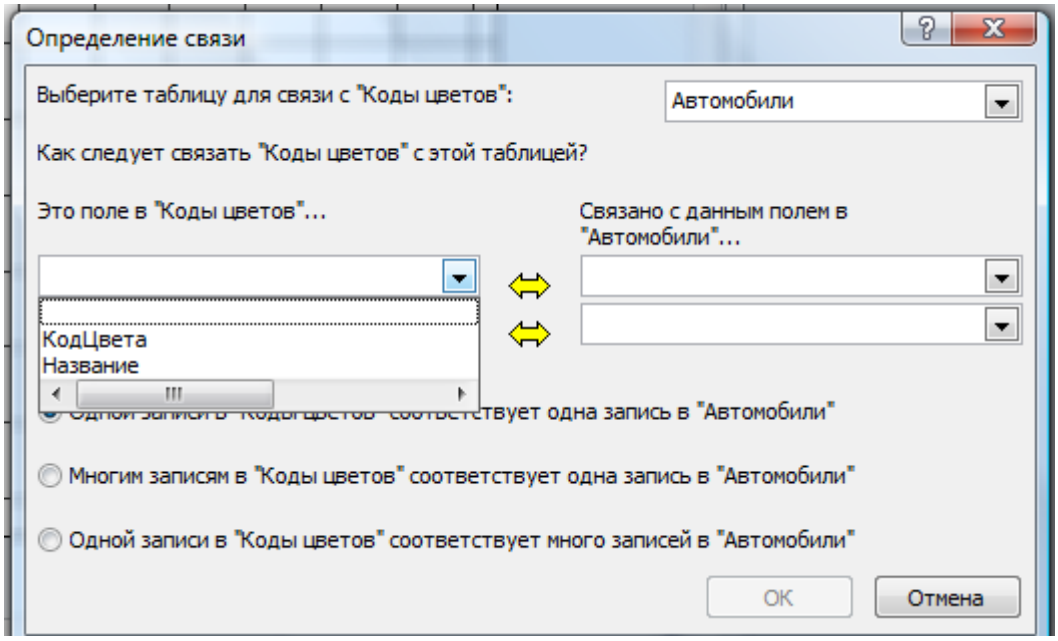


Rasm 3.16.



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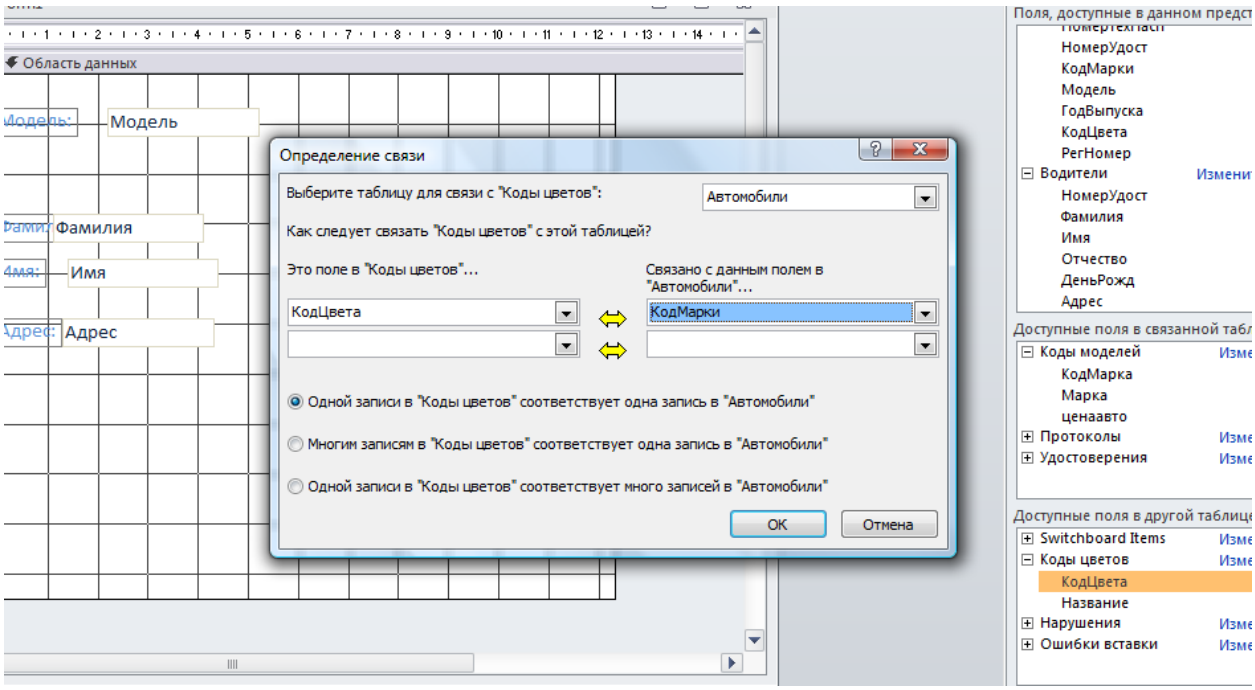

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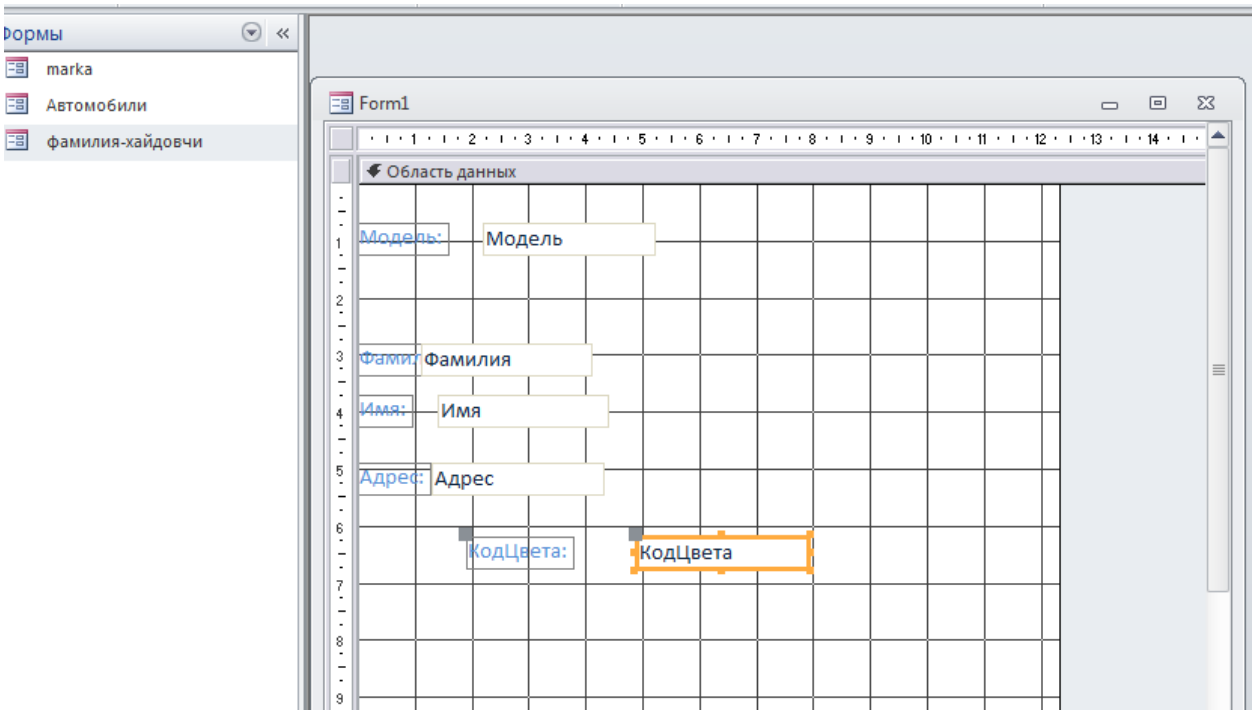

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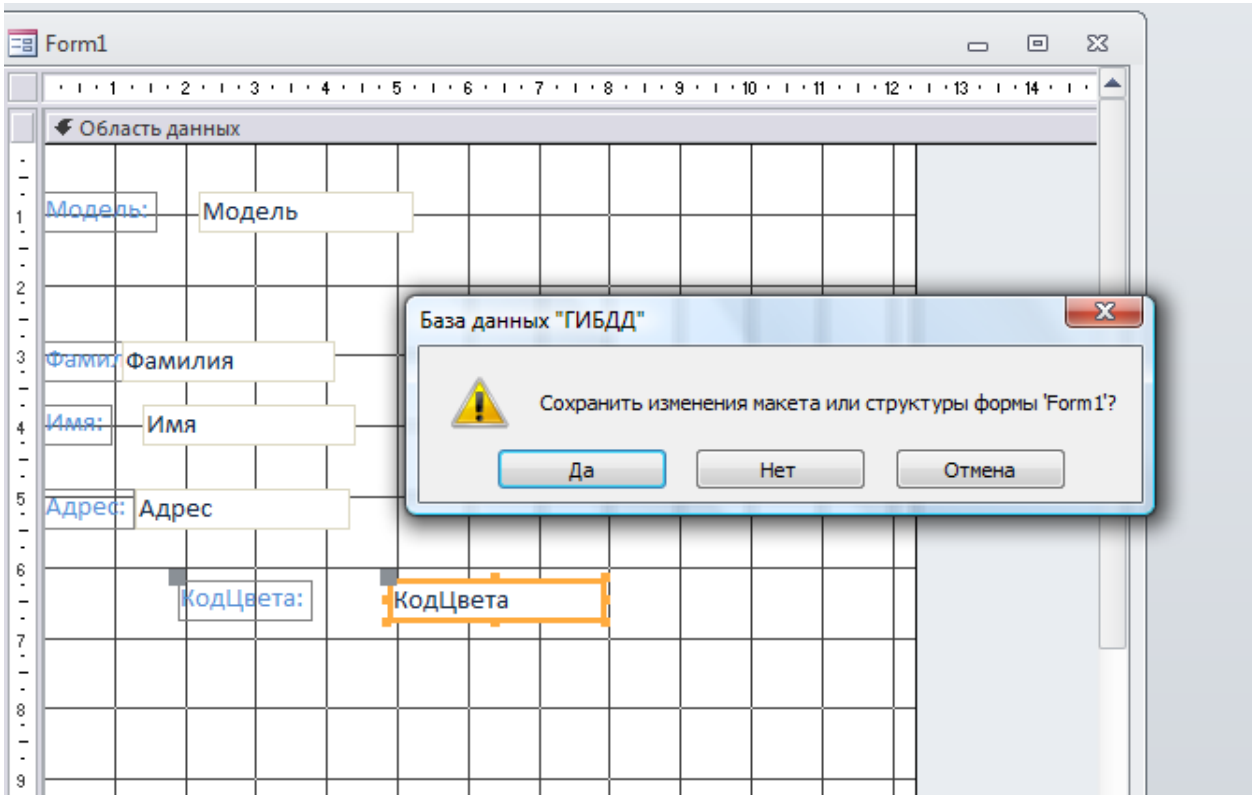

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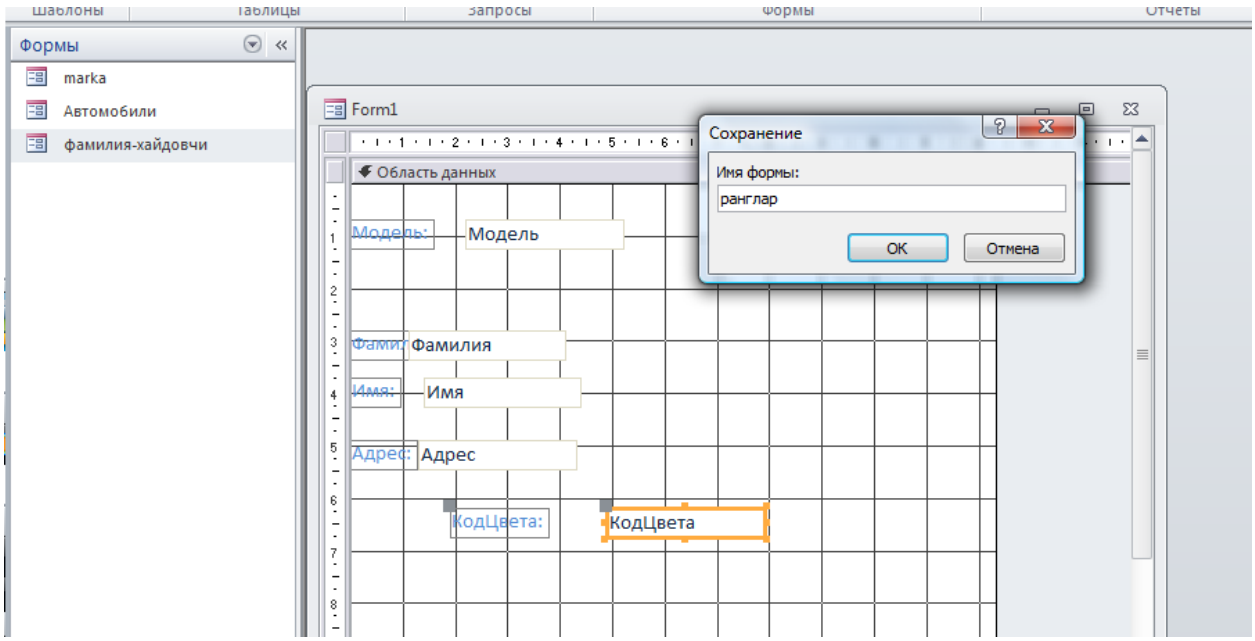
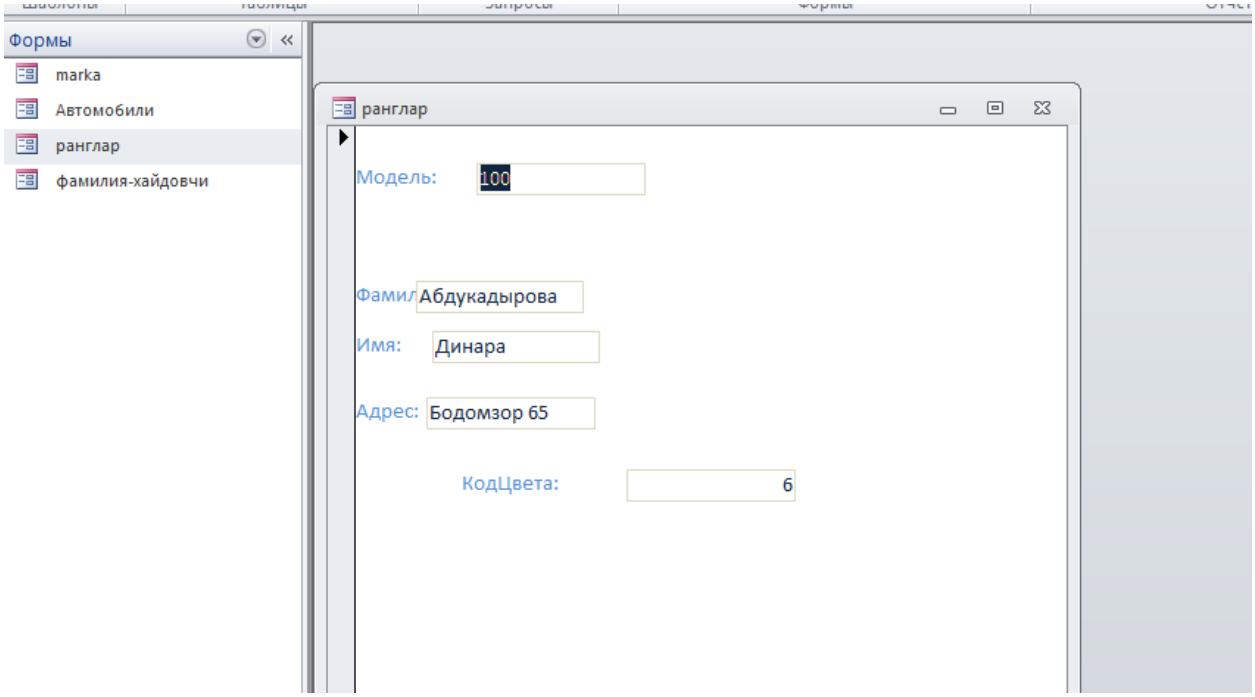
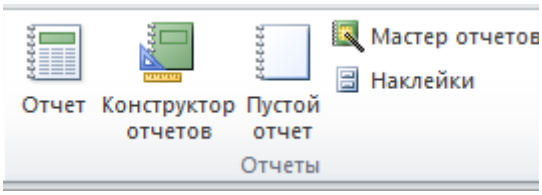


Rasm3.21.



Rasm 3.22.



Rasm 3.23.

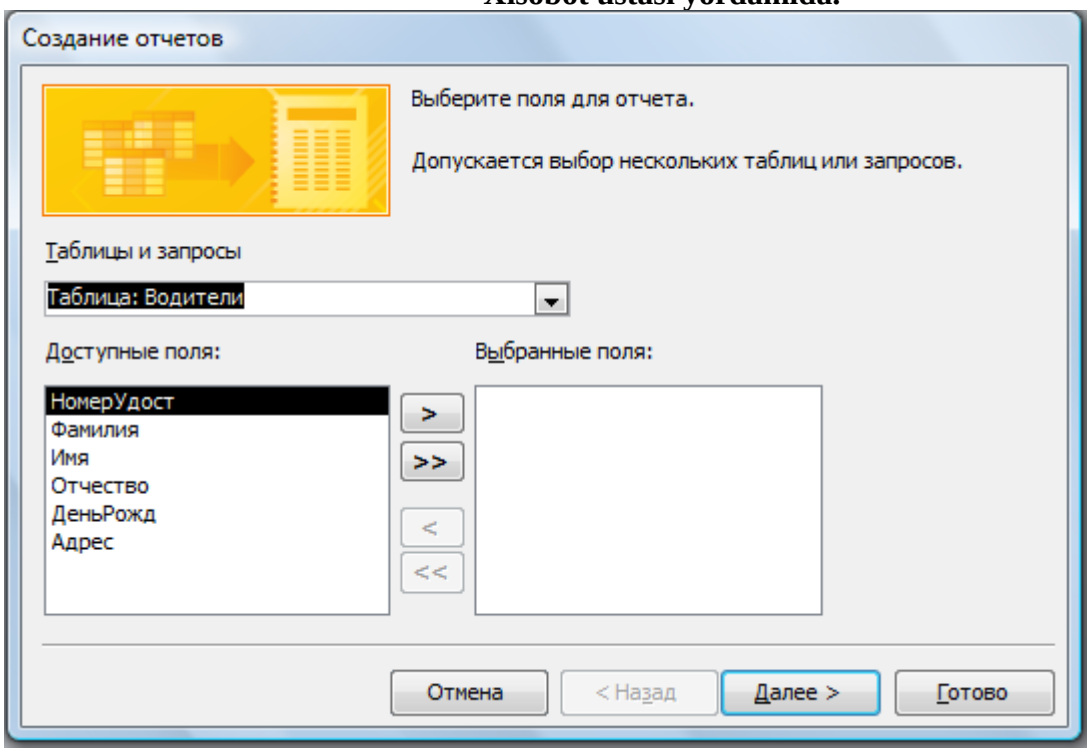
2 Xisobot tuzilmasi

Xuddi forma kabi xisobot xam boshqarish elementlariga ega qismlardan tashkil topgan, ammo bunda kismlar ko‘p-u, boshqarish elementlari formanikidan kamroq. Xisobot tuzilmasi asosan 5 kismdan iborat buladi :

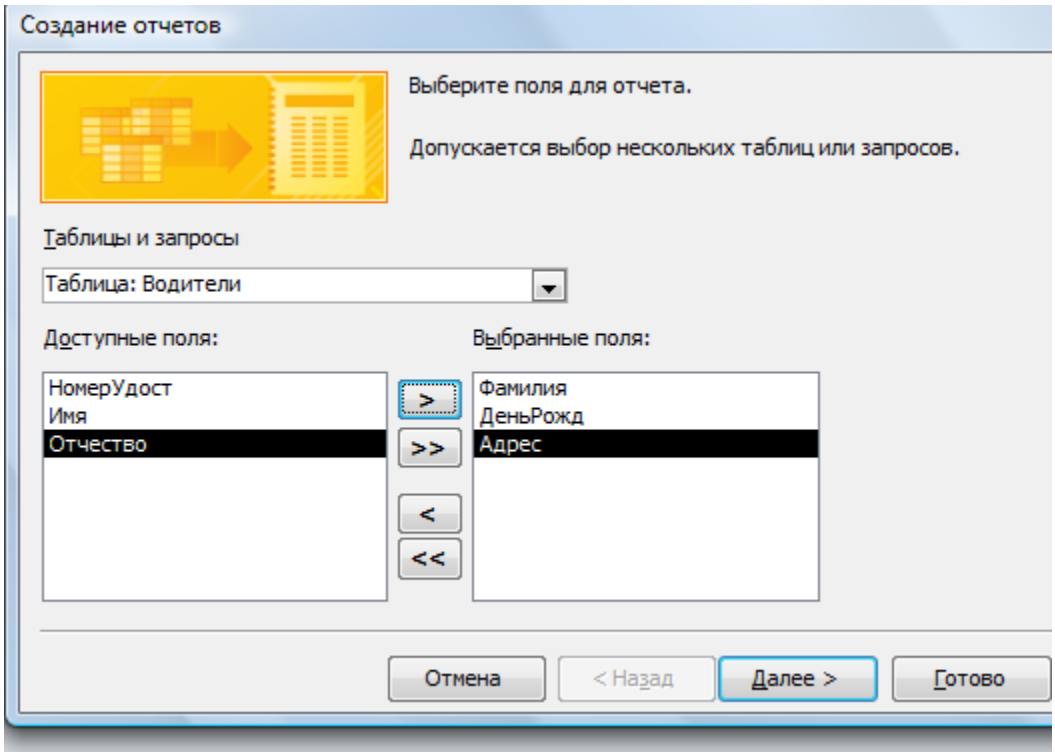
- xisobot sarlavxasi,
- yukori kolontitul,
- ma’lumotlar joylashgan joy,
- kuyi kolontitul,
- xisobot eslatmasi.

Odatda, xisobot tuzilmasi bilan tanishish uchun avtomatik ravishda xisobot tashkil kilib uni «konstruktor» tartibida ochish kulay. Bunda xisobot sarlavxasi umumiy sarlavxani chop etishni ta’minlaydi, yukori kolontitul kismlari esa sarlavxaga tegishli kichik-kichik sarlavxachalarni ifodalaydi. Ma’lumotlar maydonida esa boshkaruv elementlari joylashtirilib, ular asosan ma’lumotlar bazasi maydonlari mazmunini bildiradi. Kuyi kolontitul kismi xuddi yukori kolontitul kabi boshkarish elementlariga ega.

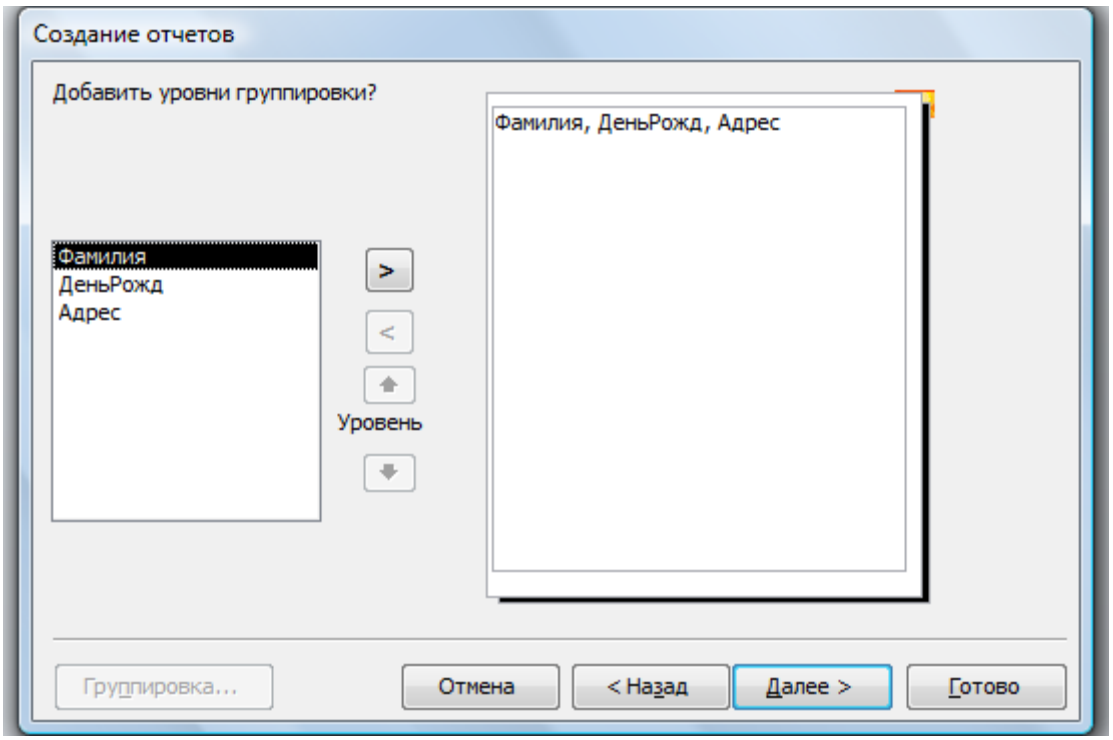
Xisobot ustasi yordamida.



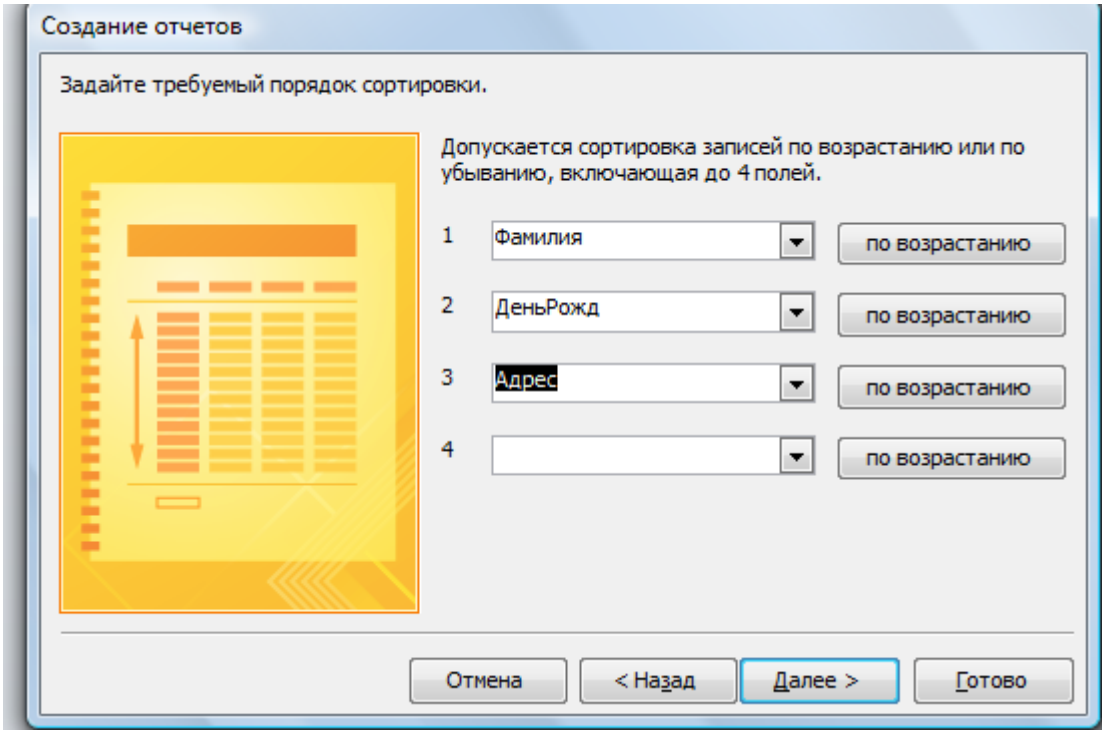
Rasm 3.24.



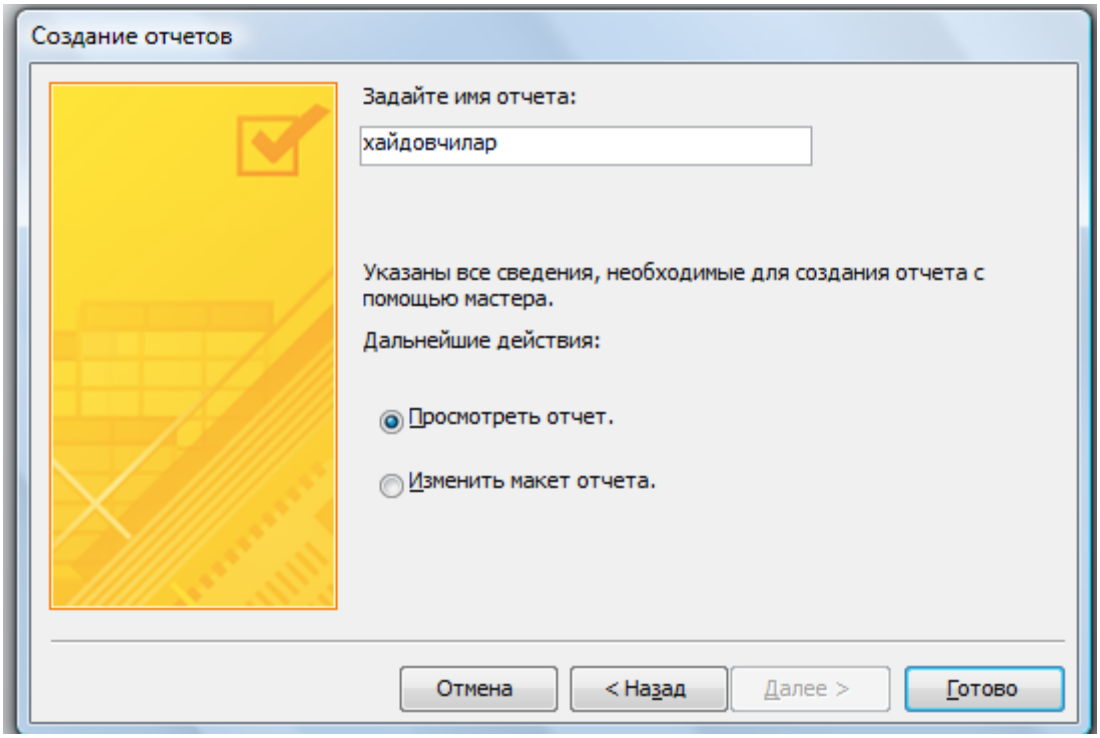
Rasm 3.25.



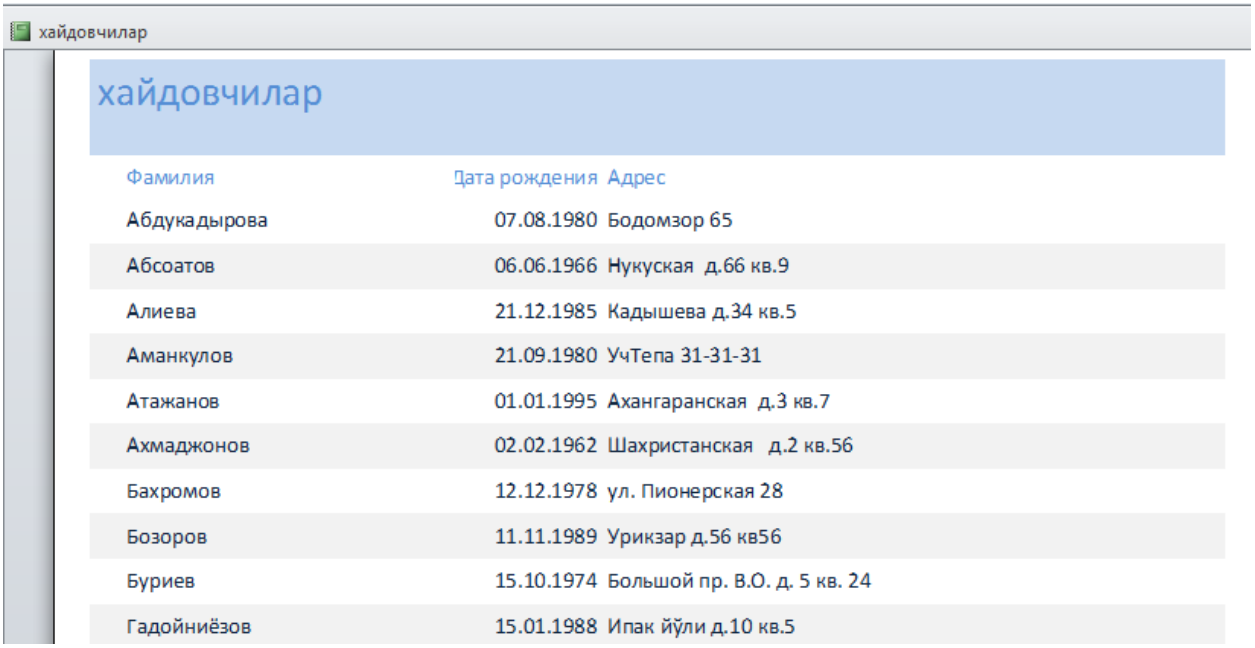
Rasm 3.26.



Rasm 3.27.

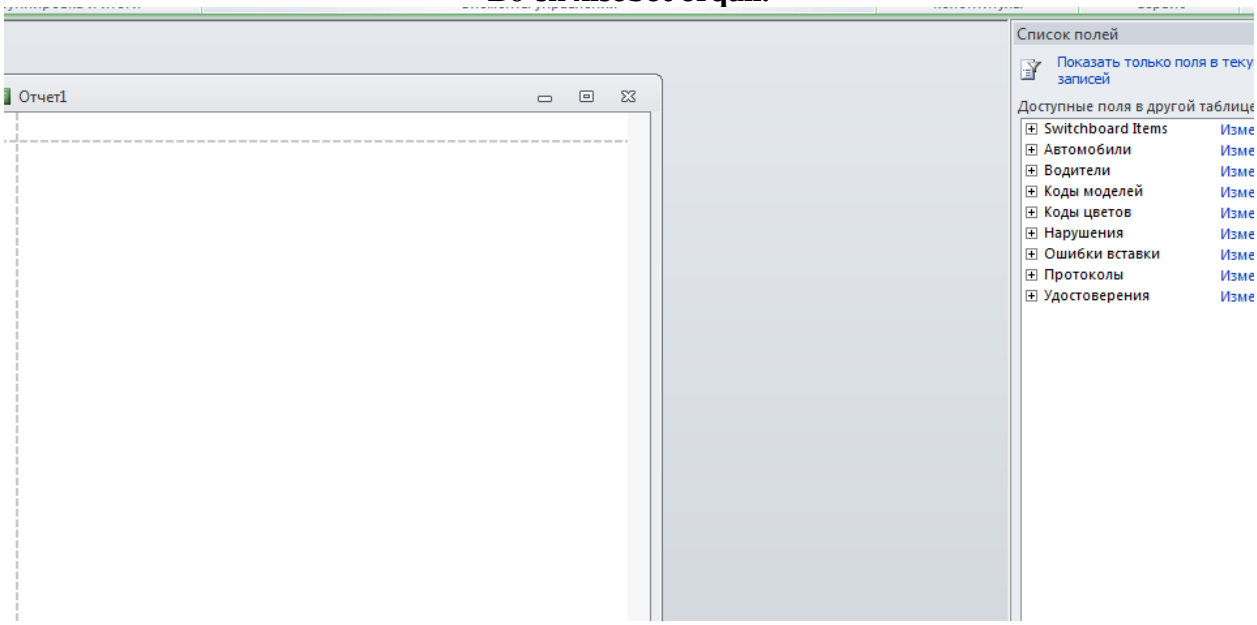


Rasm 3.28.

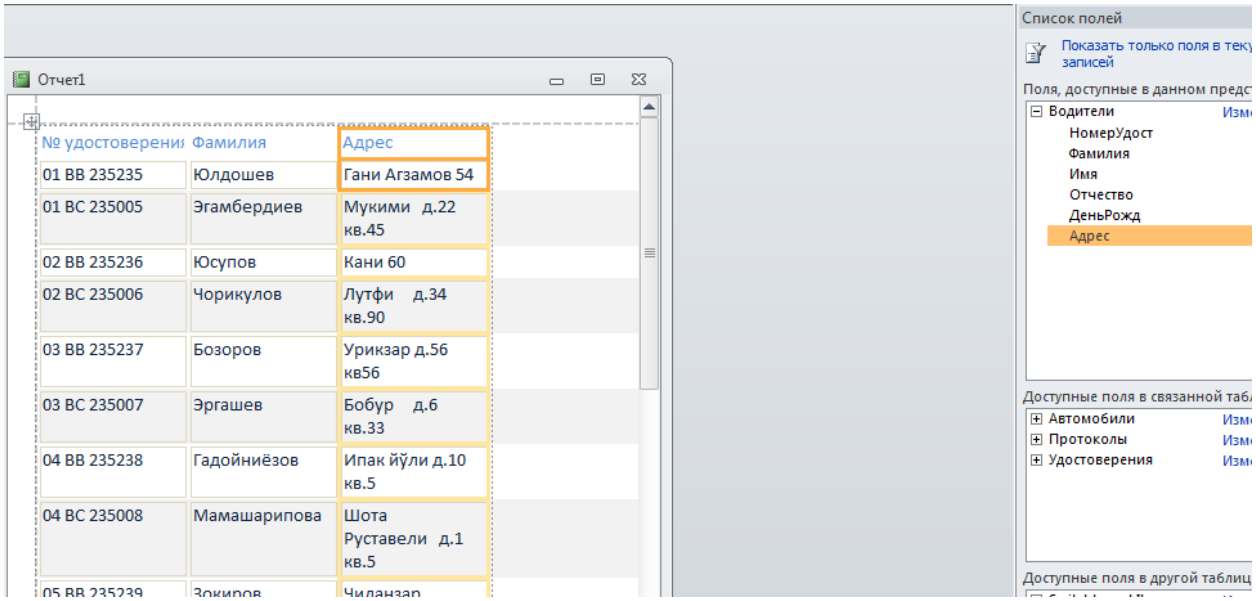


Rasm 3.29.

Bo‘sh xisobot orqali.



Rasm 3.30.



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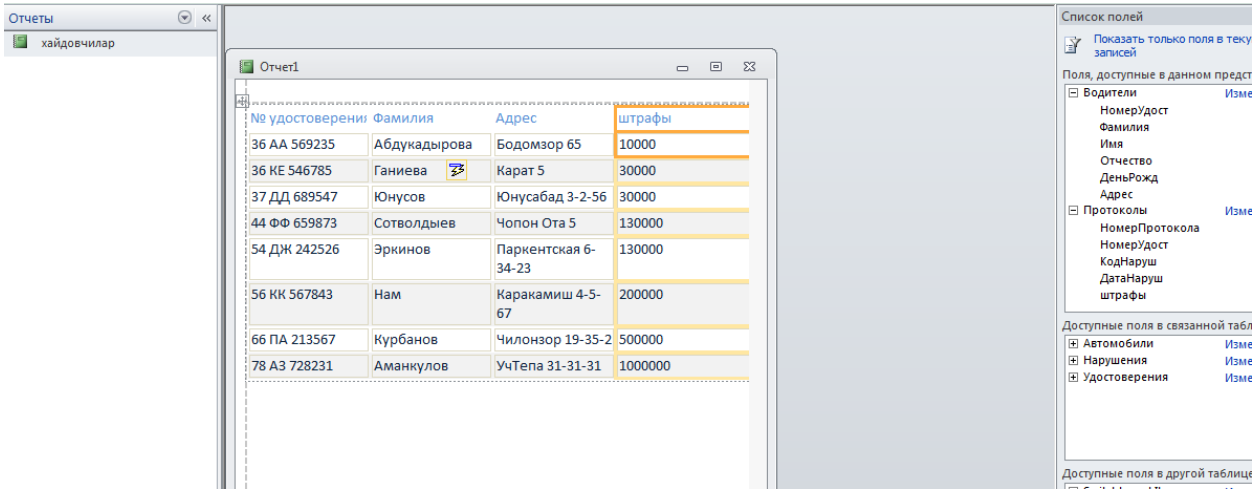

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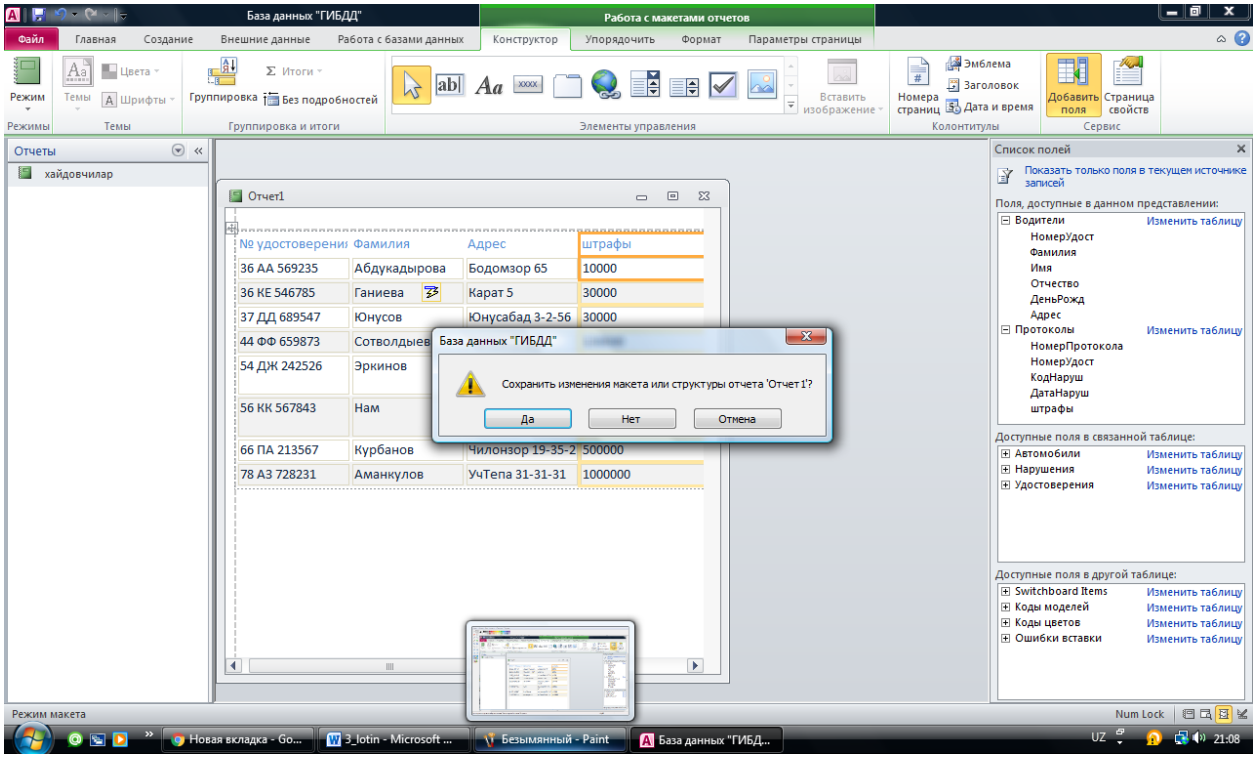

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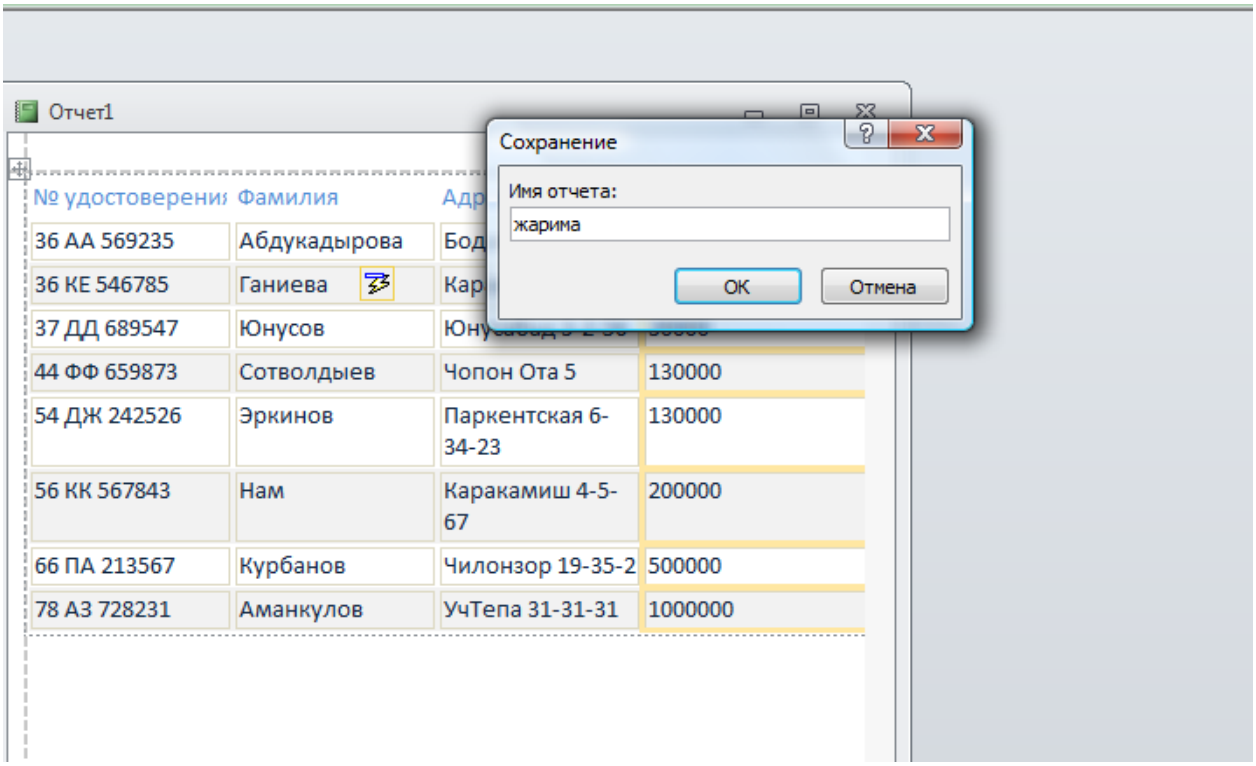
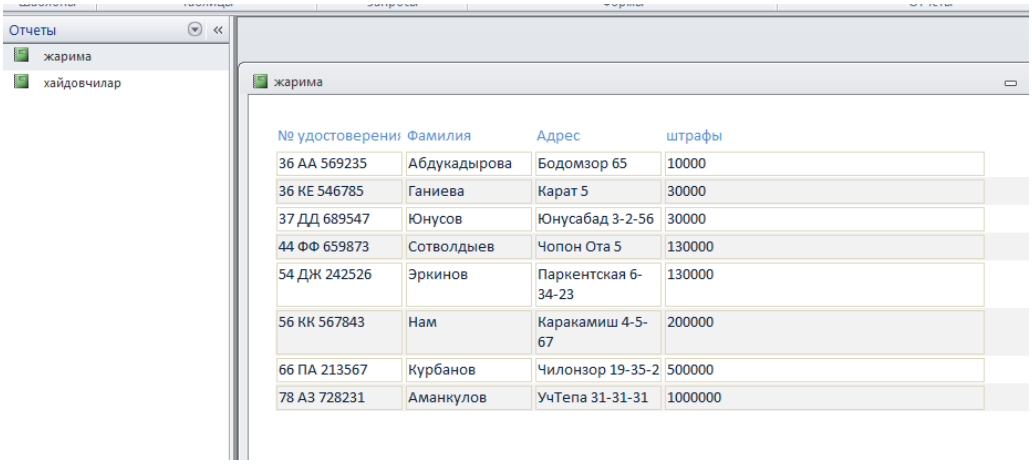
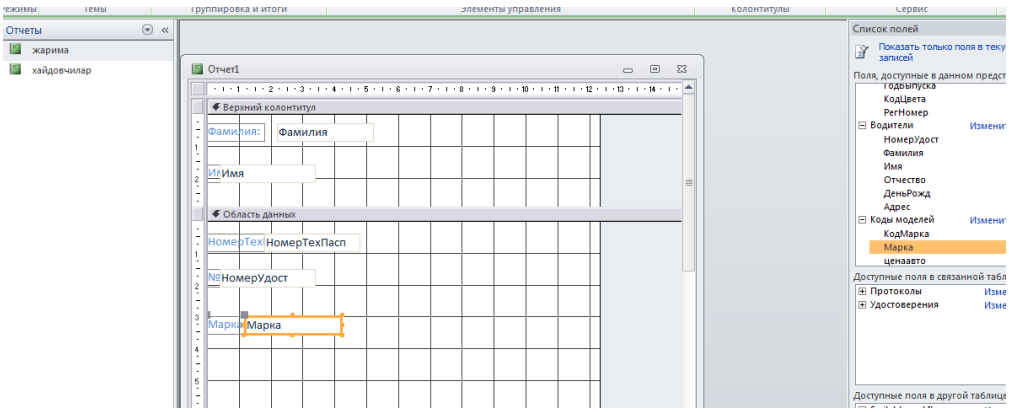


Rasm 3.34.

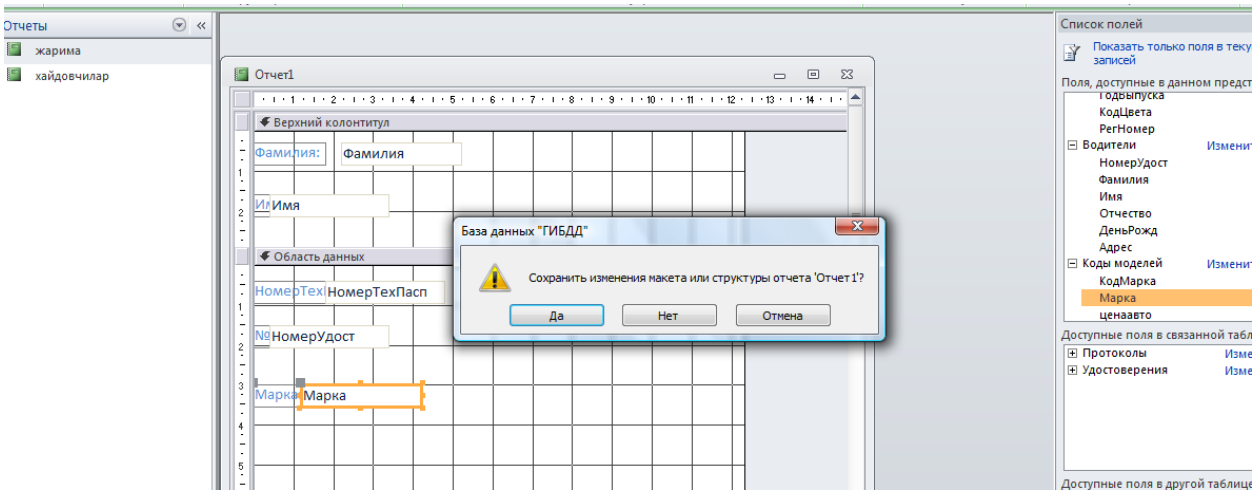


Rasm 3.35.

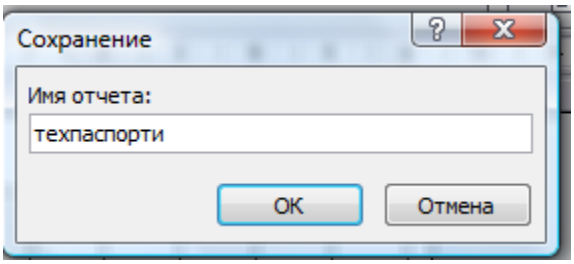
Xisobot konstuktor orqali.



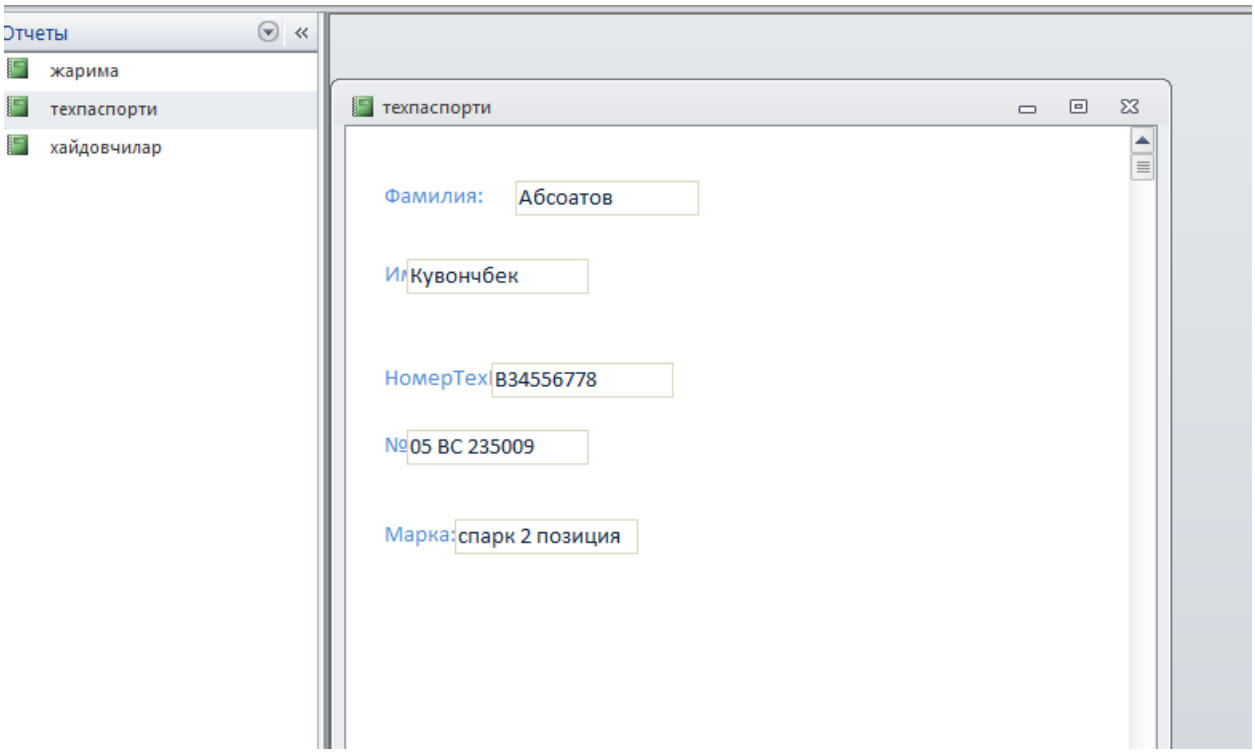
Rasm 3.36.



Rasm 3.37.



Rasm 3.38.



Rasm 3.39.

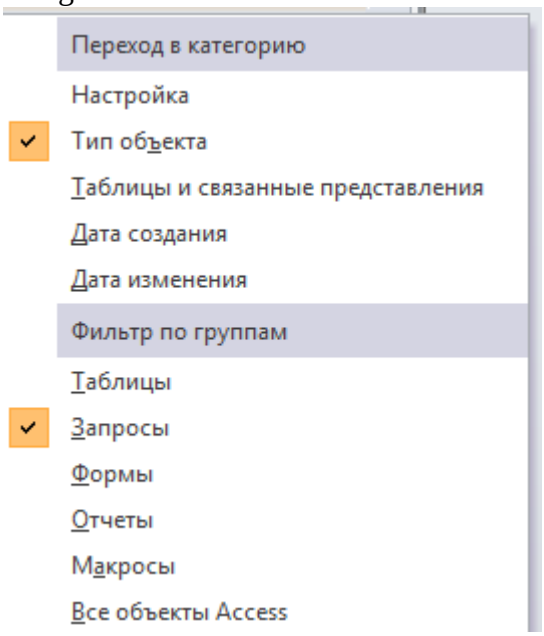
4 - LABORATORIYA ISHI
ACCESS2010DA SQL TILINI SO‘ROV YARATISH BUYRUQLARI.

Ishdan maqsad: Ma’lumotlar bazasi Accessda SQL tilida so‘rovnoma yaratish. Berilgan mavzu boyicha Accessda konstruktor rejimi orqali so‘rovnomalarni SQL tilidagi bo‘yruqlarga utish va so‘rovnomani natijasini ekranga chiqarish.

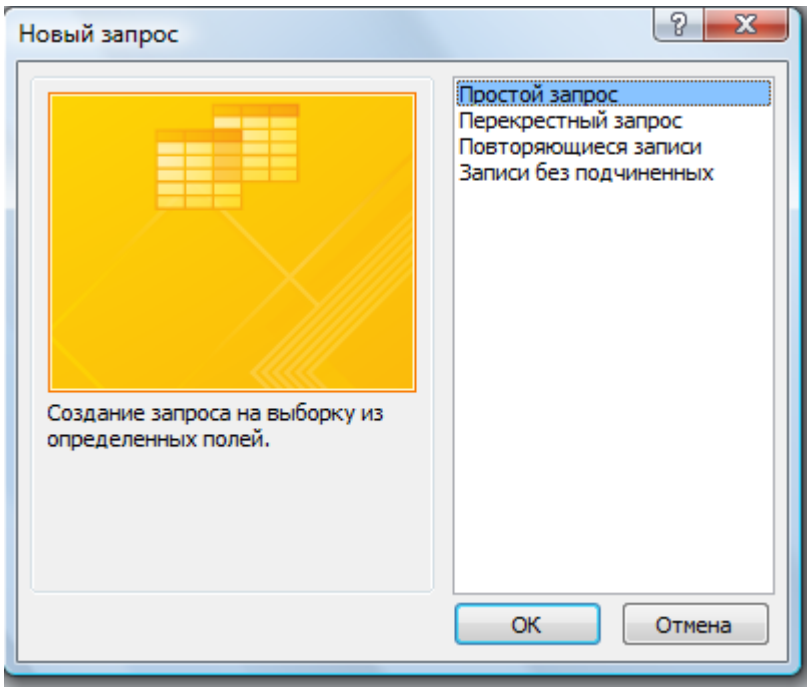
Topshiriqlar:

1. Ma’lumotlar bazasida so‘rovnomalarni tashkil qilishni o‘rganish.
2. Berilgan mavzu boyicha Accessda SQL tilida so‘rovnomalar yarating.
3. Accessda berilgan topshiriq varianti boyicha so‘rovnoma tuzing va uni kompyuterga kiriting.
4. Ish bo‘yicha hisobot tayyorlang.

Misol 1. Мастер запросов (so‘rovnoma ustasi) orqali oddiy so‘rov malumot bazasidan, jadvallardan foydalanib yarating

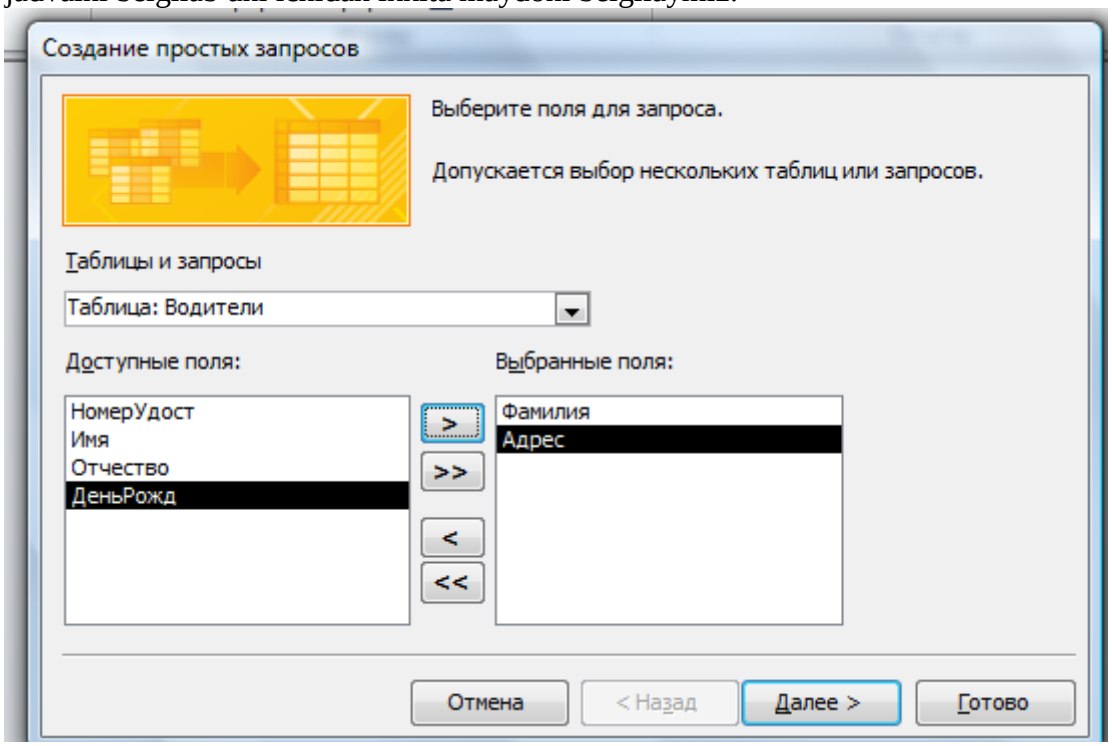


Rasm 4.1.



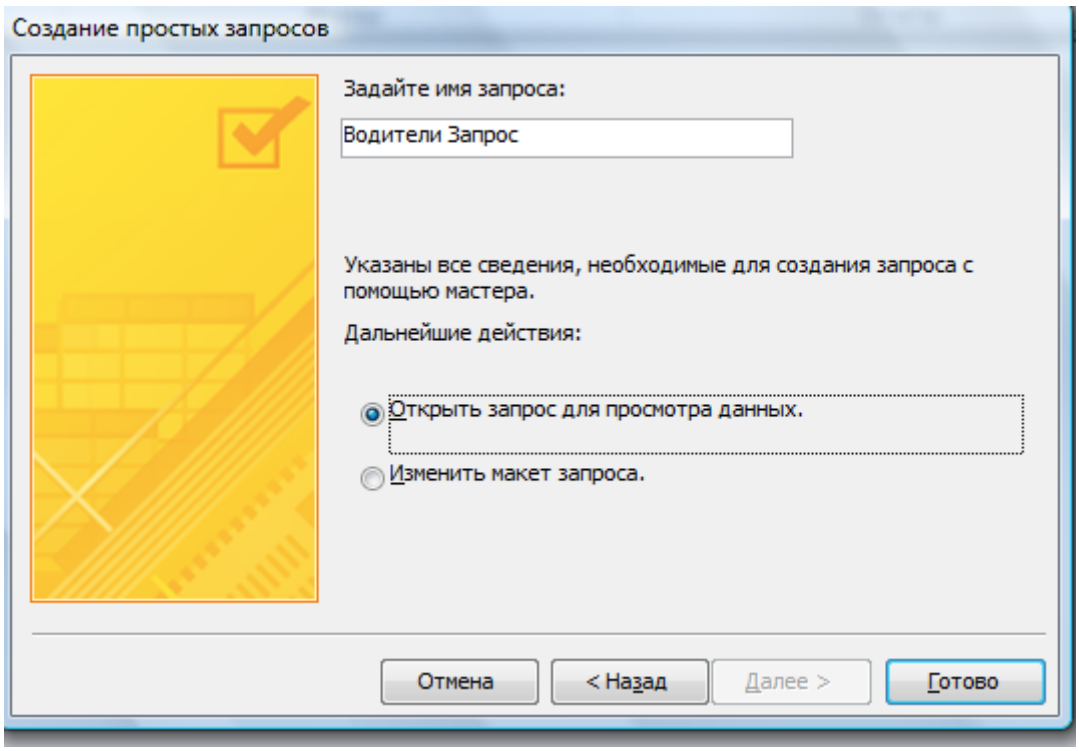
Rasm 4.2.

Простой запрос (oddiy so‘rovnomani) bo‘limini tanlab, Ok tugmani bosib, so‘ng **Водители** jadvalni belgilab uni ichidan ikkita maydoni belgilaymiz.



Rasm 4.3.

Далее tugmani bosib, so‘rovnomani nomini kiritamiz



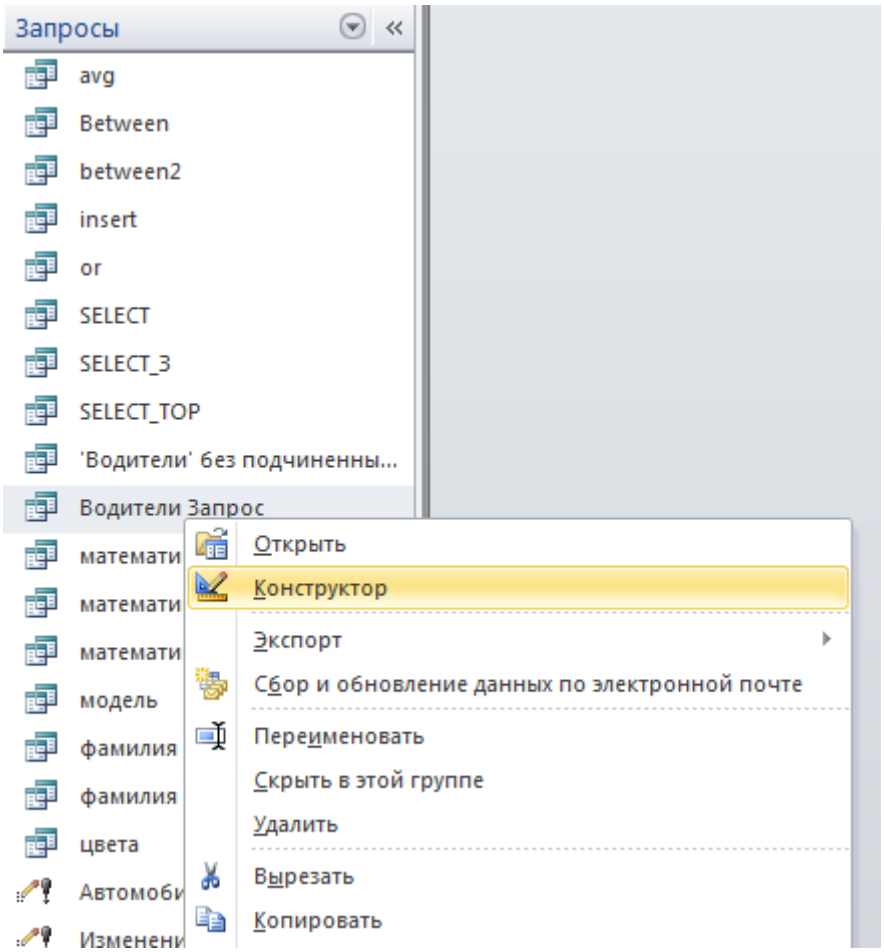
Rasm 4.4.

Открыть bo‘yrug‘ini belgilab olamiz va **Готово** ni bosamiz. Natijada talan qilingan so‘rov ochiladi.

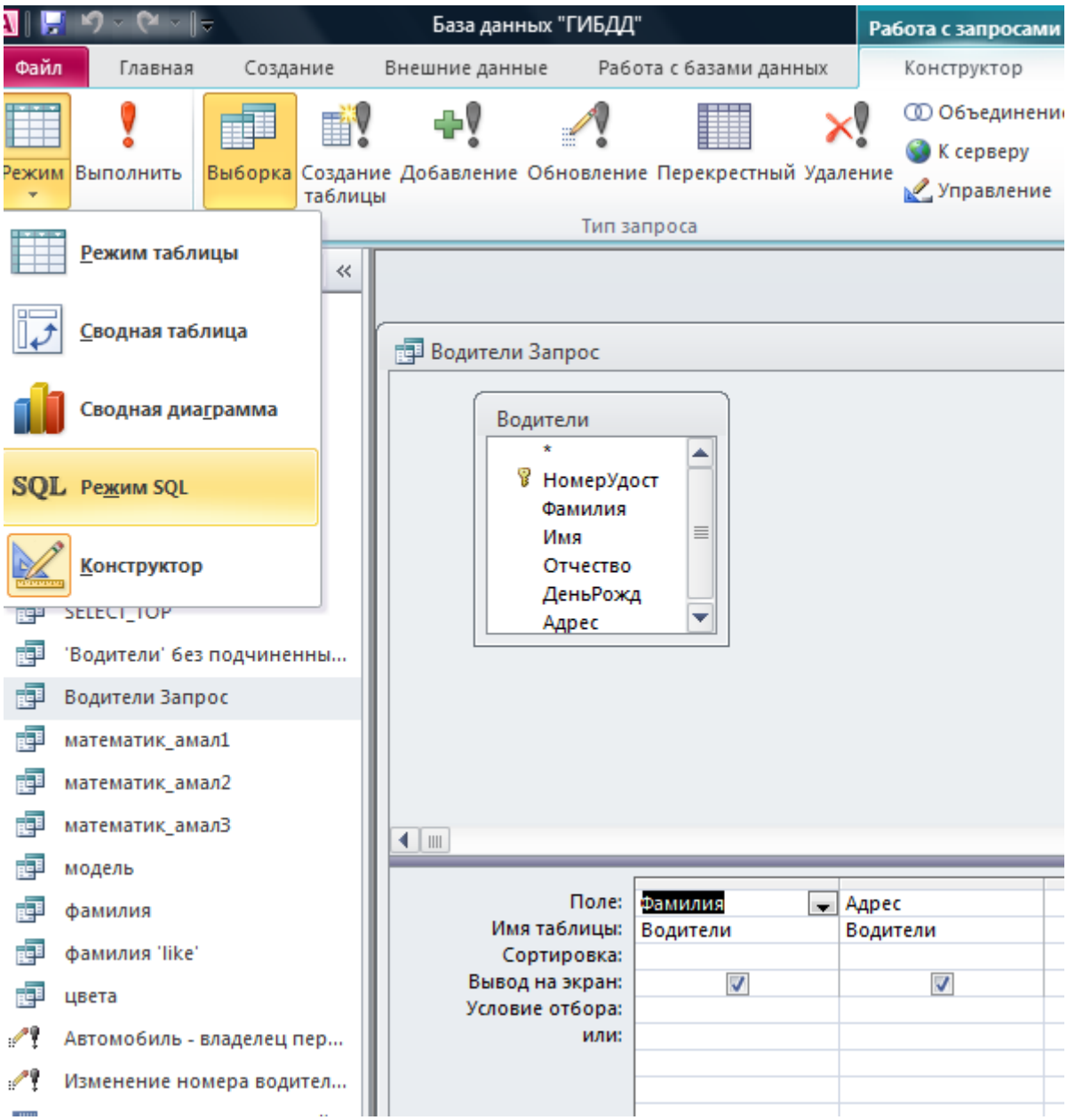
Водители Запрос

Фамилия	Адрес
Юлдошев	Гани Агзамов 54
Эгамбердиев	Мукими д.22 кв.45
Юсупов	Кани 60
Чорикулов	Лутфи д.34 кв.90
Бозоров	Урикзар д.56 кв56
Эргашев	Бобур д.6 кв.33
Гадойниёзов	Ипак йўли д.10 кв.5
Мамашарипова	Шота Руставели д.1 кв.5
Зокиров	Чиланзар квартал С д.6 кв. 2
Абсоатов	Нукуская д.66 кв.9
Каримов	Куйлюк д .24 кв. 67
Атажанов	Ахангаранская д.3 кв.7
Кенжаев	Алгоритм кв 30 д 45 кв.70
Ахмаджонов	Шахристанская д.2 кв.56
Алиева	Кадышева д.34 кв.5
Жумаев	Кушбеги д.45 кв.45
Кодиров	Карасарай д. 34 кв.56
Жураев	Водник д.23 кв.66
Комилов	Сагбан д.5 кв.6

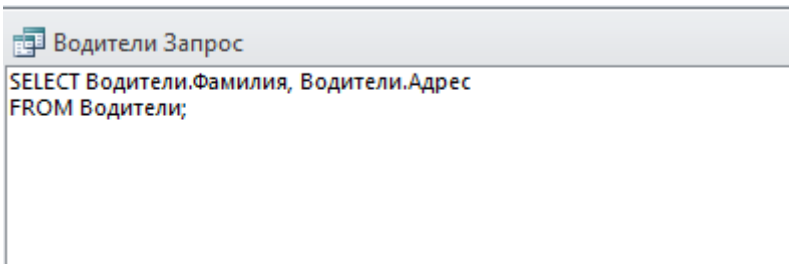
Rasm 4.5.


Запросы
avg
Between
between2
insert
or
SELECT
SELECT_3
SELECT_TOP
'Водители' без подчиненны...
Водители Запрос
математи
математи
математи
модель
фамилия
фамилия
цвета
Автомоби
Изменени
Открыть
Конструктор
Экспорт
Сбор и обновление данных по электронной почте
Переименовать
Скрыть в этой группе
Удалить
Вырезать
Копировать

Rasm 4.6.

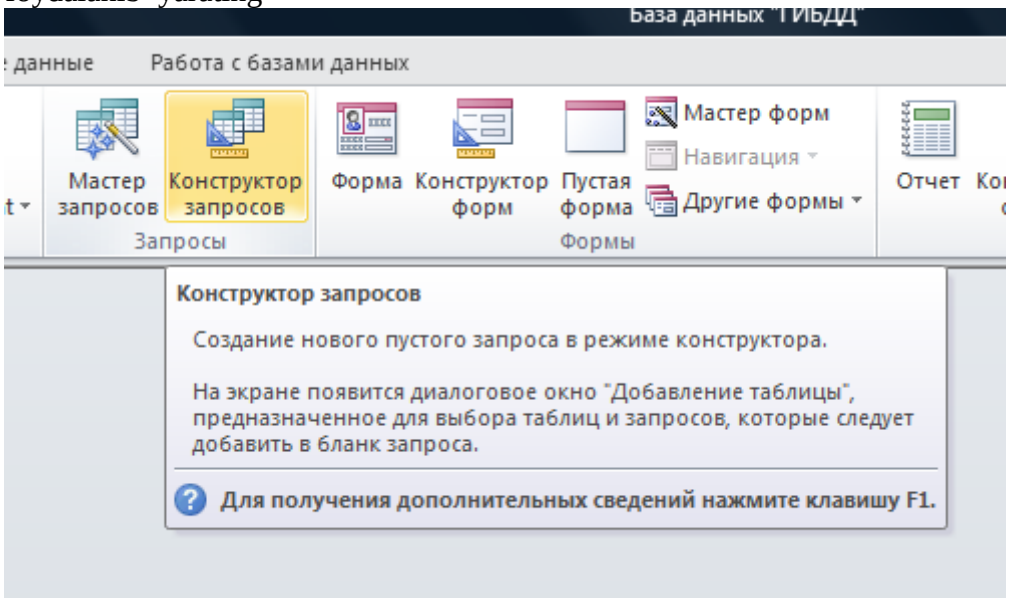


Rasm 4.7.



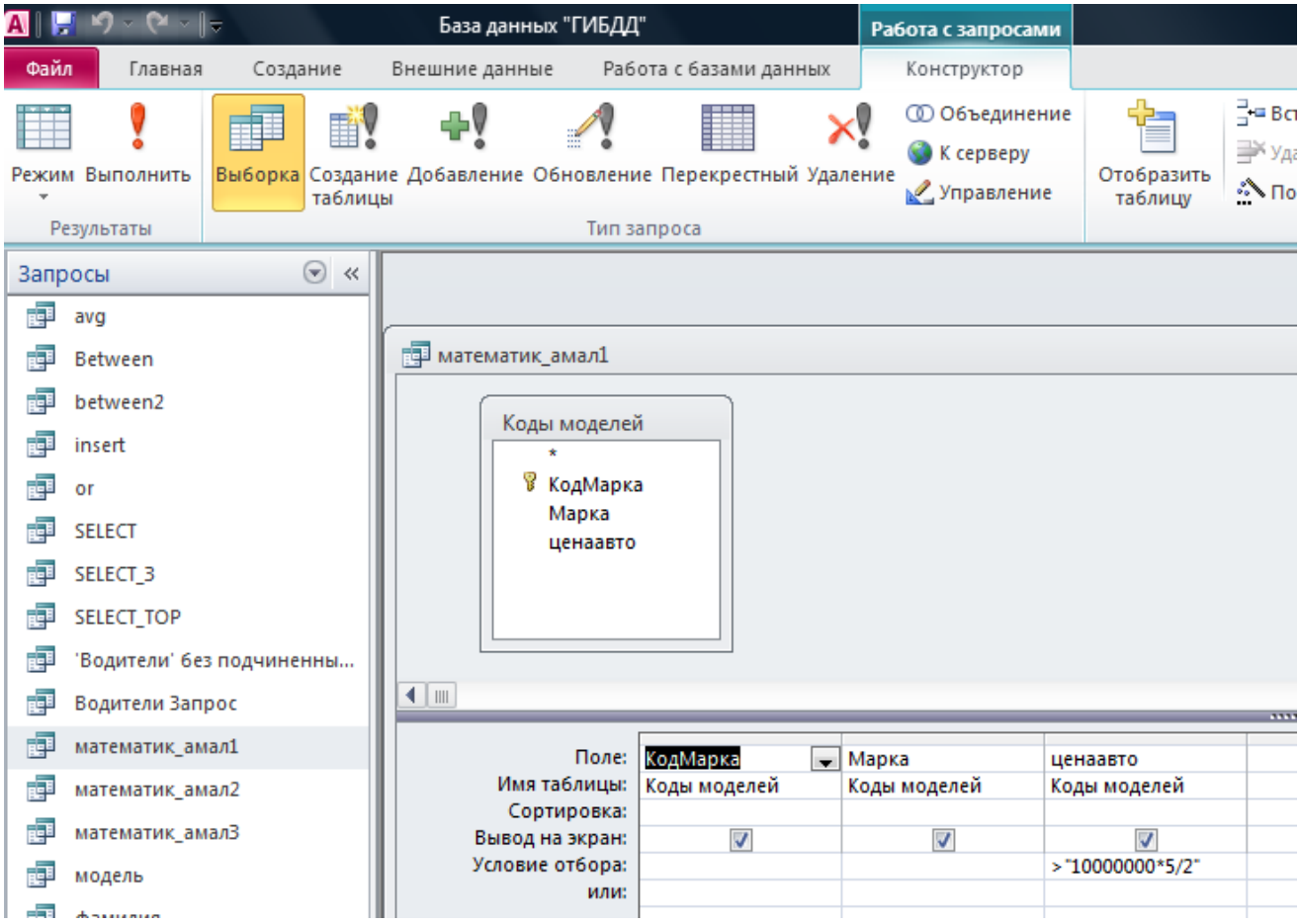
Rasm 4.8.

Misol 2. Конструктор запросов matematik _amal1 so‘rovni **коды моделей** jadvalidan foydalanib yarating

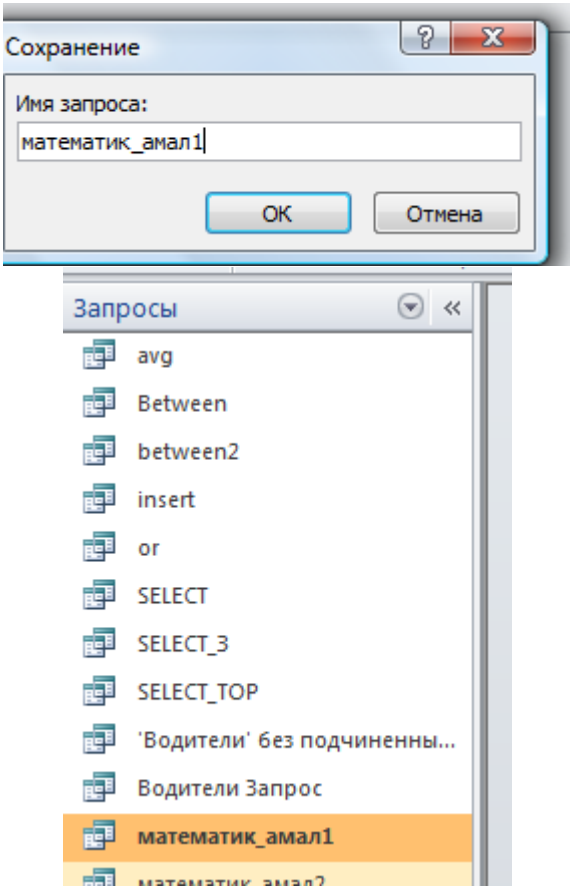


Rasm 4.9.

Конструктор rejimida qo‘rinish quyidagicha

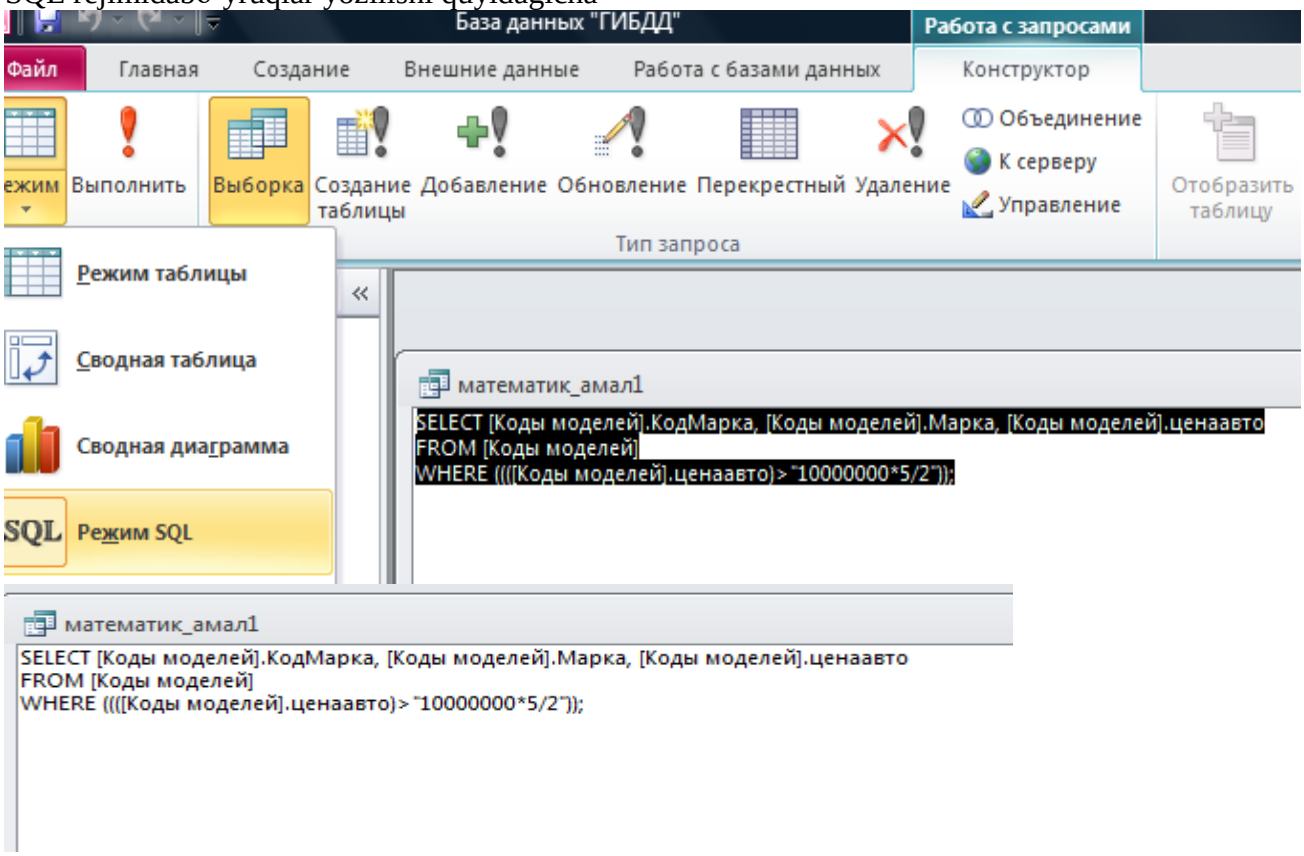


Rasm 4.10.



Rasm 4.11.

SQL rejimidabo‘yruqlar yozilishi quyidagicha



Rasm 4.12.

Va oxirida so‘rovnomani natijasi

математик_амал1

КодМарка	Марка	ценаавто
1	спарк 3 позиция	24000000
2	спарк 2 позиция	20000000
3	нексия 1 позиция	25000000
4	малибу 1 позиция	40000000
5	эпика 2 позиция	50000000
6	джентра 2 позиция	60000000
7	каптива 3 позиция	70000000
8	каптива 1 позиция	65000000
9	матиз 3 позиция	15000000
10	матиз 2 позиция	12000000
11	джентра 3 позиция	26000000
12	кобальт 2 позиция	23000000
13	кобальт 1 позиция	20000000
14	кобальт 3 позиция	21000000
15	дамас 1 позиция	19000000
16	дамас 2 позиция	19500000
17	дамас 3 позиция	22000000
18	дамас 4 позиция	23000000
19	нексия 1 позиция	23000000

Rasm 4.13.

5-LABORATORIYA ISHI.
KOMPYUTER TARMOQLARI VA TOPOLOGIYALARI.

Maqsad: Tarmoqlar ishlash printsipini o‘rganish va lokal tarmoqda ma’lumot uzatish va qabul qilishni o‘zlashtirish.

Topshiriqlar:
1. Tarmoqlar turlarini tashkil qilishni o‘rganish.
2. Berilgan mavzu boyicha tarmoqlarga ulanishni yarating va foydalanishni o‘rganing .
3. Berilgan topshiriq varianti boyicha kompyuterga kiriting.
4. Ish bo‘yicha hisobot tayyorlang.

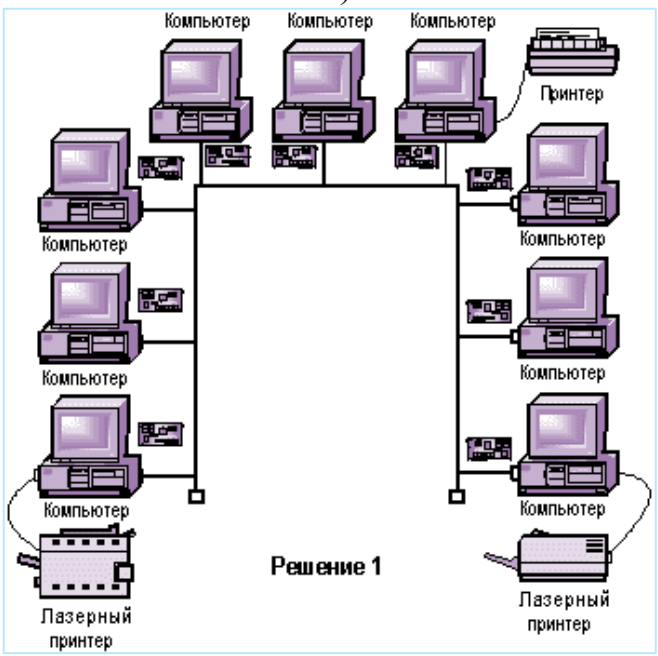
Ushbu laboratoriya ishida kompyuter tarmoqlari bilan bog’lik bo‘lgan bir qancha masalalarni ko‘rib chiqamizki, ular internet bilan bog’lik bir qancha muammolarni to‘g’ri xal qilishga va tushunishga imkon beradi

Kompyuter (hisoblash) tarmog’i — bu, aloqa kanallari orqali yagona tizimga bog’langan kompyuter va terminallar majmuasidir.

Masalini to‘g’ri tushunish esa o‘z navbatida internet tizimida ongli ravishda va samarador ishlashga olib keladi.

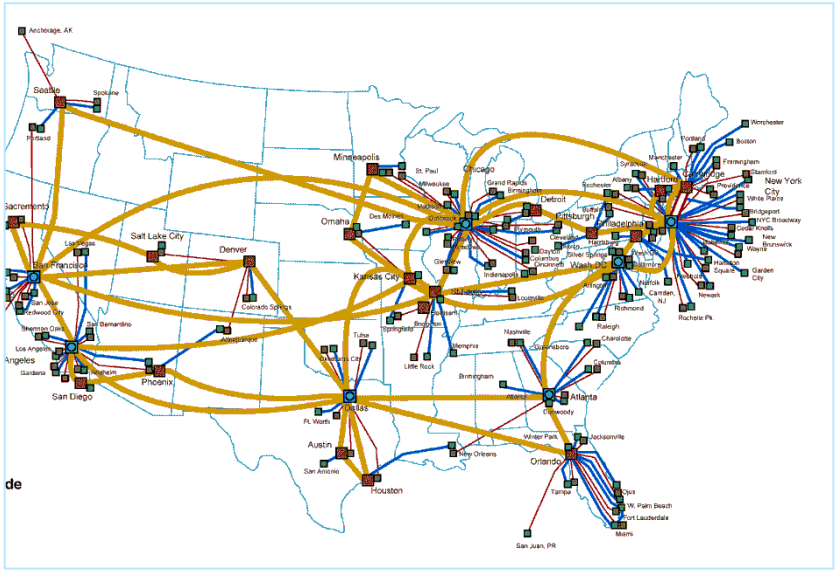
Abonent tizimlarining xududiy joylashuviga qarab kompyuter tarmoqlarini uchta asosiy turkumga ajratish mumkin:

• lokal tarmoqlar (LAN Local Area Network).



Rasm 5.1.

• mintaqaviy tarmoqlar (MAN Metrorolitan Area Network);



Rasm 5.2.

• global tarmoqlar (WAN Wide Area Network);

Rasm 5.3.

1.1. Lokal tarmoqlar.

Tashqi qurilmalar (periferiya vositalar) bilan aloqa qilish uchun kompyuter aloxida portlarga ega va u orqali ma’lumotlarni uzatishi yoki kabul qilishi mumkin. Agarda ushbu portlar orqali ikki yoki bir necha kompyuterlarni ulansa, ular o‘zaro ma’lumot almashina oladilar. Ushbu xolda ular ***kompyuter tarmog’ini*** xosil qiladilar. Agarda kompyuterlar bir-birlaridan unchalik uzoq masofada joylashmagan bo‘lsalar va bir xil tarmoq jixozlariga ega bo‘lgan xolda

bir xil dasturiy ta’minot asosida boshqarilsalar, u xolda bunday tarmoqni ***lokal tarmoq*** deb ataladi. Eng sodda va oddiy lokal tarmoqlar ishchi guruxlarga xizmat ko‘rsatish uchun ishlatiladilar. Ishchi gurux deb biror bir loyixa ustida ishlayotgan mutaxassislar guruxiga yoki biror bir bo‘lim xodimlariga aytiladi.

1.2. To‘g’ri (bevosita) ulanish.

Windows operatsion sistemasida ishlatgan ikki kompyuterni ularning parallel portlariga ulangan maxsus kabellar orqali o‘zaro birlashtirish mumkin. Ushbu xolda bunday tarmoq uchun xech qanday ko‘shimcha texnikaviy yoki dasturviy ta’minot zarur bo‘lmaydi. Apparat ulanish rolini standart parallel port oynaydi, ulanishni boshqarish uchun zarur bo‘lgan dasturviy ta’minot esa operatsion sistemada mavjuddir. Bevosita bog’lanishda kompyuterlarning biri asosiy va boshkasi ko‘shimcha deb aniqlanadi. Asosiy kompyuterdan tarmoq orqali birgalikda kirish ruxsat berilgan barcha disk va papkalarga kirish mumkin. Ushbu asosiy kompyuterning operatori esa bir kompyuterdan boshqasiga ma’lumot uzatishni boshqarishi mumkin.
Ko‘rib chiqilagtgan **bevosita ulanishning yaxshi tomoni uning oddiyligidir**, chunki ushbu xolda xech qanday ko‘shimcha apparat yoki dasturviy ta’minot zarur bo‘lmaydi. Uning asosiy kamchiligi esa ma’lumot uzatilish tezligining ancha pastligidir. Shuning uchun xam bunday bevosita ulanish tashkilot va korxonalarda nisbatan kam ishlatiladi. Ular ko‘prok madaniy-maishiy xizmatda ishlatiladi. Bunga misol sifatida kompyuter oyinlarini keltirish mumkin.

1.3. Ish stantsiyalari va fayl serveri.

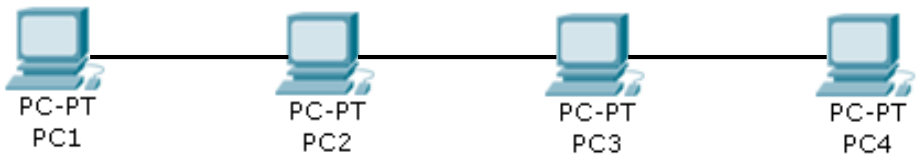
Ikkitadan ortiq kompyuterlarni ulash uchun to‘g’ridan-to‘g’ri ulanish etarli emas. Bu xolda xar bir kompyuterga tarmoq platasini o‘rnatish va ularni kabellar orqali birlashtirish kerak xamda bu kompyuterlarning birgalikda ishlashlarini ta’minlovchi maxsus dasturlarni ishga tushirish lozim. Ba’zi bir tarmoqlarda maxsus boshkaruvchi kompyuter bo‘lib, ularni ***fayl serveri*** deb ataladi. Bunday tarmoqdagi boshqa oddiy kompyuterlar esa ***ish stantsiyalari*** deb ataladilar.

1.4.Bir xil imkoniyatli kompyuterlarga ega bo‘lgan tarmoqlar.

Agar kompyuter tarmog’ida maxsus ajratilgan kompyuterlar (ya’ni fayl serveri) mavjud bo‘lsa, bunday tarmoqlar ***klient (mijoz)-server*** turidagi kompyuter tarmoqlari deb ataladilar. Agarda bunday turdagi maxsus server mavjud bo‘lmasa, tarmoqdagi barcha ish stantsiyalari bir xil imkoniyatlarga ega bo‘ladilar va demak, bunday tarmoqlarni bir xil imkoniyatli kompyuterlarga ega bo‘lgan tarmoqlar deb ataladi. Bunday kompyuter tarmoqlarining yaxshi tomonlaridan biri – ularga maxsus dasturviy ta’minot zarur emas. **Windows** operatsion sistemasida bir xil imkoniyatli kompyuterlarga ega bo‘lgan tarmoqlarni boshqarish uchun barcha imkoniyatlar mavjud. Ish stolida **Setevoe okrujenie** deb nomlangan belgi bo‘lib, u turtilsa, tegishli darcha ochiladi va uning yordamida ish guruxining xar bir a’zosi mustaqil ravishda boshqa kompyuterlarga kira oladi, xamda xamkasabalarining birgalikda ishlash uchun ochilgan (yoki xosil qilingan) papka va fayllaridan xamda amaliy dasturlaridan bemalol foydalana oladi. Undan tashqari **Windows** operatsion sistemasi birgalikda ishlatiladigan ma’lumotlarga kirish rejimlarini boshqarishga xam imkon beradi. Bunday boshqaruv usulini amalga oshirish ***sistemaviy sigsat*** yoki ***sistemaviy qoidalar*** deb ataladi. Lokal tarmoq ishiga mas’ul va tegishli sistemaviy ***sigsat*** ni o‘rnatuvchi Shaxsni *sistema adminstratori* deb ataladi. Demak, agarda tashkilotda lokal tarmoq mavjud bo‘lsa, unda albatta sistema administratori xam bo‘lishi lozim. Uning asosiy majburiyatlari jumlasiga lokal tarmoqda ishlayotgan xodimlarni tegishli ma’lumotlar bilan ta’minlash va kerak bo‘lsa amaliy yordam berish kiradi.

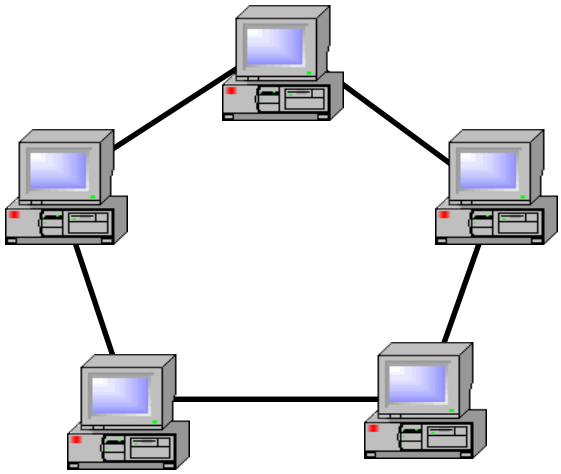
1.5. Lokal tarmoqlar topologiyasi.

Lokal tarmoqning tuzilishiga va undagi kompyuterlarning o‘zaro bog’likligi qandayligiga uning topologiyasi deb ataladi. Ularning quyidagi asosiy turlari mavjud:
1.***Shina*** turiga mansub topologiY. Bu turdagi tuzilish juda oddiy bo‘lib, unda tarmoqdagi barcha kompyuterlar bitta kabelga ulangan bo‘ladi. Ushbu kabel orqali tarmoq faoliyati uchun zarur bo‘lgan ma’lumotlar majmuasi, adreslar va boshqaruv ma’lumoti xarakat qiladi.



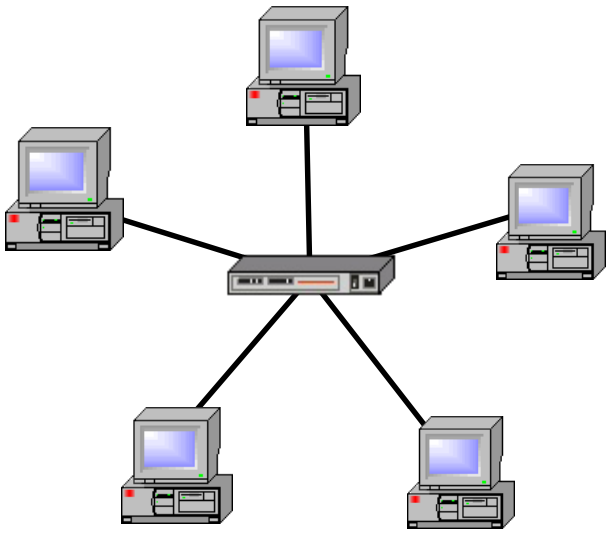
Rasm 5.4.

1. Barcha kompyuterlari aylanma usulda bir biri bilan ulangan turdagi tuzilma ***aylanma*** tarmoq deb ataladi.



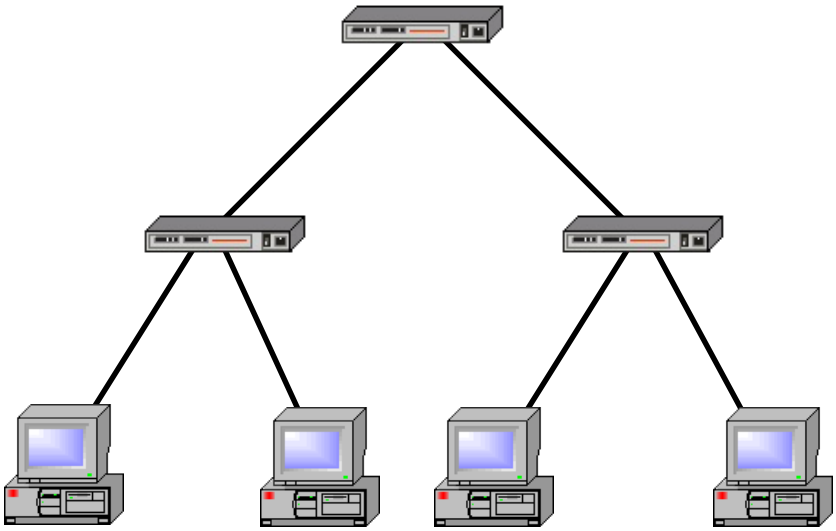
Rasm 5.5.

2. Fayl serveri asosida tashkil kilingan tarmoqlar uchun ***yulduzli*** ko‘rinishdagi topologiya xam qo‘llanilishi mumkin. Bunda tarmoq kompyuterlari yulduzsimon usulda bir-biri bilan bog’langan bo‘ladi.



Rasm 5.6.

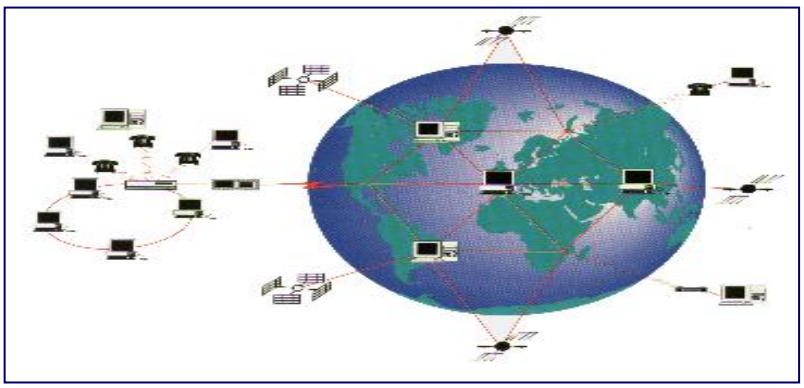
3. **Ierarxik** ko‘rinishdagi tarmoq tuzilishi biri-biriga bog’lik bo‘lgan tuzilmalar majmuasi shaklida bo‘lib, ularning **xar bir ishchi guruxida bittadan fayl serveri** bo‘ladi va butun tuzilma (yoki **tashkilot) uchun**



Rasm 5.7.

bitta markaziy server mavjud bo‘ladi;

4. **Aralash** ko‘rinishdagi tarmoqlarda yukorida ko‘rsatilgan barcha turdagi topologiya turlari ishlatilishi mumkin. global tarmoqlar ko‘pincha xuddi Shunday topologiyaga, ya’ni, tuzilishga ega bo‘ladilar.



Rasm 5.8.

1.6. Lokal tarmoqlarning ishlashi.

Yukorida ko‘rib chiqilgan barcha kompyuter tarmoqlarining asosiy moxiyatini ular uchun ***ma’lumotlarni va resurslarni*** birgalikda ishlatish imkoniyatini yaratishdir deb ifodalashimiz mumkin. Bunda avvalo ma’lumotlarni birgalikda ishlata olish imkoniyati tushuniladi. Biror bir loyixa ustida ish olib borayotgan insonlarga ko‘pincha o‘z xamkasabalari tomonidan yaratilgan ma’lumotlar va dasturlardan keng mikyosda foydalanishga to‘g’ri keladi. Kompyuterlararo tarmoq alokasi xosil kilinganligi tufayli bunday Shaxslar ma’lumotlardan galma-galdan navbat orqali emas, balki baravariga foydalanish imkoniyatiga ega bo‘ladilar. Bundan tashqari lokal tarmoqda ishlovchilar kompyuterning xilma xil jixozlarini xam birgalikda ishlatish imkoniga ega bo‘ladilar. Masalan, ko‘pincha bo‘lim uchun bitta printer sotib olib, bo‘lim xizmatchilarining barchasining kompyuterlarini lokal tarmoqqa ulagan xolda undan umumiy foydalanishni tashkil qilish ancha arzonroq tushishi mumkin. Jixozlar, dasturlar va ma’lumotlarni resurslar degan jamlama so‘z bilan ifodalash mumkin. Demak, lokal tarmoq tuzishdan maqsad – ***resurslarni*** birgalikda ishlatish imkonini yaratishdir. Bundan tashkari, lokal tarmoqning ***administrativ funktsiyalari*** xam mavjud, ya’ni biror-bir loyixa boyicha bajarilagtgan ishlarni nazorat kilish va boshkarish masalalari xam tarmoq tashkil qilingan taqdirda ancha samarador amalga oshiriladi. Chunki aloxida mustaqil kompyuterlarda bajarilagtgan ishlarni nazorat kilishdan ko‘ra, tarmoqdagi kompyuterlarda bajarilagtgan ishlarni nazorat qilish osonroq bo‘ladi.

1.7. Tarmoq protokoli va paketli protokol.

Kompyuterlarning lokal tarmoqdagi faoliyatini xamda bir-biri bilan aloqasini tegishli dasturlar boshqarib va nazorat qilib turadilar. Kompyuterlarning bir-birlarini tushunishlari va o‘zaro ma’lumot almashina olishlari uchun ular bir xil tilda so‘zlasha olishlari kerak. Tarmoqdagi kompyuterlarning bunday ma’lumot almashinish tili ***tarmoq protokoli*** deb ataladi. Keyingi paytlarda paketli protokollar keng mikyosda ko‘llanila boshladi. Bunday protokollarni ishlatganda kompyuterlararo almashinayotgan ma’lumotlar kichik-kichik qismlarga yoki bloklarga bo‘linadilar. Xar bir aloxida bo‘lak (blok) o‘ziga xos **«konvert»** larga solinadi va natijada ma’lumotlar paketi xosil bo‘ladi. Bunday paketlar ma’lumotlarning o‘zini xamda xizmatchi ma’lumotlarni o‘z ichiga qamrab oladi. Ya’ni, u kimga yo‘naltirilgan, kimdan jo‘natilgan, paketlar ketma-ketligi qanday va xakozo. Paketli protokol ma’lumotlar paketining tarmoqdagi xarakatini, adresat tomonidan uning olinishini va kichik paketlardan to‘la ma’lumot matnining yig’ilishini ta’minlab beradi. Xar bir ish stantsiyasi davriy ravishda tarmoqqa bog’lanib turadi va undan o‘tayotgan paketlarning xolatini tekshirib turadi. U o‘ziga yo‘naltirilgan paketlarni olib qoladi va boshkalarini uning adresi boyicha jo‘natadi.

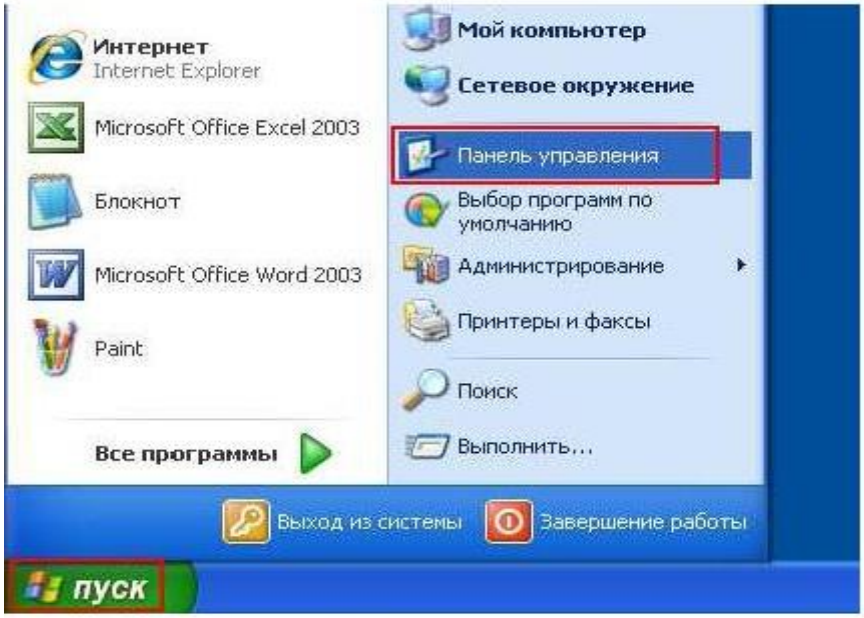
Paketli alokaga mos bo‘lgan oddiy bir misol ko‘rib chikamiz. Masalan, biz to‘rt varakdan iborat bo‘lgan xat yozdik va ularni 1,2,3,4 deb belgiladik, xamda xatlarni to‘rt aloxida pochta kutisiga tashladik deb faraz qilaylik. Xatning xar bir bo‘lagi adresatga o‘z yo‘li bilan aloxida boradi. Faraz qilamizki, adresatga ushbu xatning bo‘laklari 2,3,4,1 ketma-ketligida keldi. Xatimiz bo‘laklarining ushbu ketma-ketligini bildiruvchi xizmat ma’lumoti majudligi tufayli adresat ularning xammasini olgandan so‘ng xatni to‘la ravishda tiklay oladi va uni o‘kishni amalga oshiradi. Bunday usulda ma’lumot almashinishda konvertlarning axamiyatiga e’tibor bering – u nafaqat xatning kobig’i, balki uni to‘g’ri o‘qiy olishni ko‘rsatib beradigan qoidalar to‘plami xamdir. Ushbu qoidalar aloqa vazirligi tomonidan o‘rnatilgan pratokol elementlaridir desak, mubolog’a qilmagan bo‘lar edik. Konvertda undagi ma’lumotni qaerga olib borish lozimligi (oluvchining adresi xamda pochta indeksi) va egasi topilmagan takdirda xatni qaerga qaytarib yuborish kerakligi (xat jo‘natuvchining kaytarma adresi) xamda to‘lov amalga oshirilganligi xaqidagi ma’lumot (marka) ko‘rsatilgan bo‘ladi. Agarda konvert

noto‘g’ri yoki tushunarsiz to‘ldirilgan bo‘lsa yoki unda marka mavjud bo‘lmasa, protokolga rioya qilinmagan deb xisoblanib, xat tegishli manzilga etib bormaydi.

Windows operatsion sistemasi bir kancha tarmoq pratokollarini ko‘llashga imkon beradi. Lokal tarmoq taShkil kilinganda qanday texnik jixozlar ishlatilganiga karab, ma’lumot almaShiniShning u yoki bu turdagi pratokolini ishlatish mumkin. Pratokolning turi **BoShqaruv paneli** («**Panel upravleniya**») panelidagi «**Set i udalenniy dostup k seti**» belgisi orqali tanlanishi mumkin. Buning uchun «**Pusk**» tugmachasini bosib, «**Nastroyka**» imkoniyati tanlanadi va undan so‘ng «**Set i udalenniy dostup k seti**» belgisi turtiladi.

TCP/IP protokolni Windows XP operatsion tizimida sozlash

1. **Пуск** tugmasi orqali **Панел управления** kiramiz.

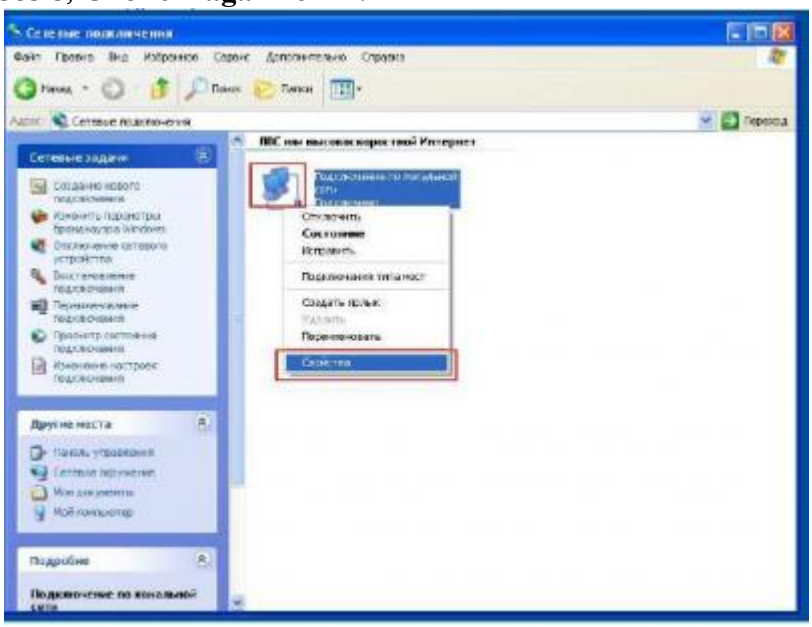


Rasm 5.10.

2. Uni ichida esa **Сетевые подключения** bo‘limini tanlab olamiz.

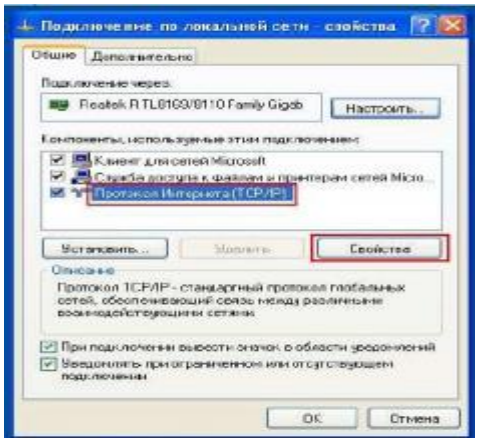
Rasm 5.11.

3. Keyingi qadamda **Подключение по локальной сети** bo‘limini belgilab olib, sichqoncha o‘ng tugmasini bosib, **Свойствага** kiramiz.



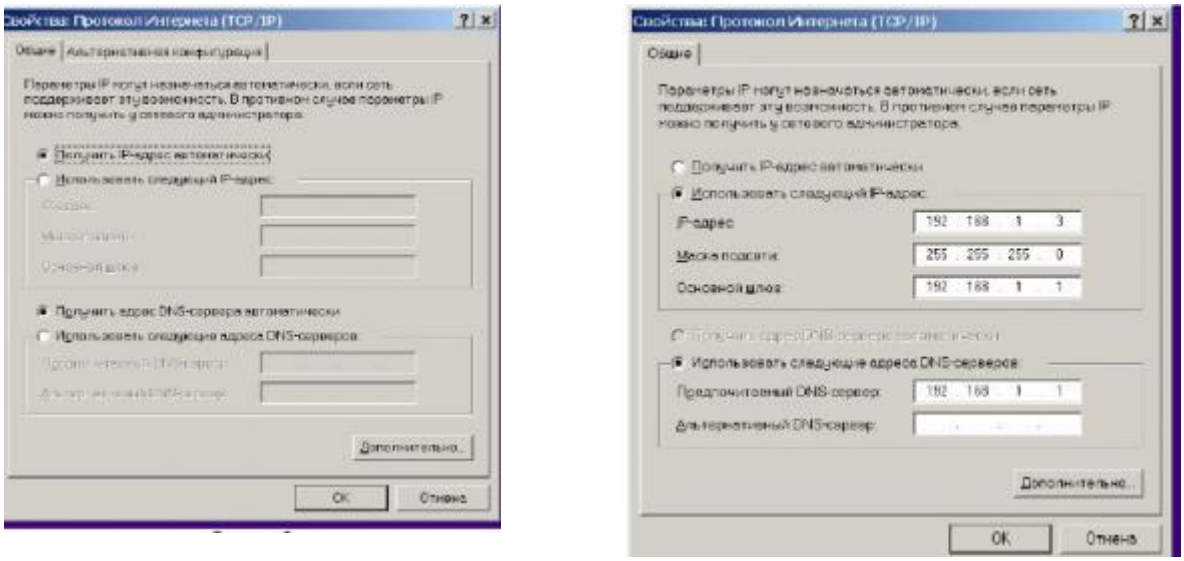
Rasm 5.12.

4. Протокол Интернета (TCP/IP) belgilab, Свойства tugmasini basamiz, so‘ng OK.



Rasm 5.13.

5. **Получит IP – адрес автоматически** (avtomatik tarzda IP – adres ko‘rish) joyiga nuqta ko‘ying.



Rasm 5.14.

6– L A B O R A T O R I YA I SH I
C++ ALGORITMIK TILNING CHIZIQLI OPERATORLAR. DASTURLARI BILAN ISHLASH.

Ishning maqsadi. C++ dasturlash tilida ishlash xakida kiskacha nazariy ma’lumotlar va matematik funktsiyalarni echish kunikmalarini xosil kilish.

Topshiriqlar:

1. C++ dasturlash tilida ishlash xakida qisqacha nazariy tushunchaga ega bulish va matematik funktsiyalarni echish kunikmalarini xosil qilish;
2. Berilgan topshirikni quyida keltirilgan reja asosida bajarish;
3. Ish bo‘yicha hisobot tayyorlang.

Nazariy qism:

Funktsiyalar, formulalar.

Dasturlash yaratilayotgan proektni yozishning maxsus usuli. Bir qarashda dasturni qayta ishlash uchun kompyuter xotirasiga kiritish etarliyu, ammo uning stili va ayniqsa o‘ziga xos yozilishining ahamiyati yo‘qdek bo‘lib ko‘rinadi. Aslida esa dastur tushunarli va o‘qish uchun oson bo‘lishi kerak. Zarurat tug’ilganda uni tushuna olish yoki unga kerakli o‘zgartirishlar kiritish mumkin bo‘lishi kerak. Ham tabiiy, ham matematik tillarda tasvirlangan ifodalar vositalaridan oqilona foydalanish sifatli dasturlar yaratishning etarli shartlaridan hisoblanadi.

Dastur tuzish ijodiy ish hisoblanadi, chunki hatto aniq ifodalangan maqsadga etish uchun usullarni izlash ham umumiy holda yangi bilim va ko‘nikmalarni ishlab chiqish va qo‘llashni talab qiladi. Ba’zi xususiy hollarda sistemaliroq va formalroq dasturlash protseduralarini topish mumkin. Agar dasturlash uchun qoyilgan masala algoritm ko‘rinishida tasvirlangan bo‘lsa, u holda dasturlash algoritmning yozilish tilidan bajaruvchi tomonidan tushunarli bo‘lgan tilga ko‘chirishdan iborat bo‘ladi. Ba’zi bir matematik modellarda o‘tkazish masalasi tugal echiladi. Algoritmlarning yozuvlarini o‘tkazuvchi sistematik protseduralarni izlash yoki dasturni masalaning shartlaridan va qo‘shimcha ma’lumotlar asosida yaratish ***sintez dasturi*** va uning ***dasturni translyatsiya qilish*** xususiy holining mavzusi (predmeti) hisoblanadi.

Dasturlash metodikasi dasturning zarur spetsifikatsiyalari usullariga asosiy e’tiborni qaratadi, chunonchi spetsifikatsiyaga joylashtirilgan ma’lumotlardan unumli foydalanish dasturning ishonchliligini oshiradi. Dasturning to‘g’riligini tekshirishni osonlashtiruvchi uning strukturasini yaratish dasturlashning asosiy aspekti hisoblanadi.

Dastur parametrlari asosida dasturning asosiy hisoblash ishlarining usullari tayyor formulalar asosida hisoblashlardan iborat bo‘ladi. U kattalik berilgan sonlar ustida biror-bir amallarni bajaruvchi formula yordamida tasvirlangan bo‘lsin. Amallar quyidagilardan biri bo‘lishi mumkin:

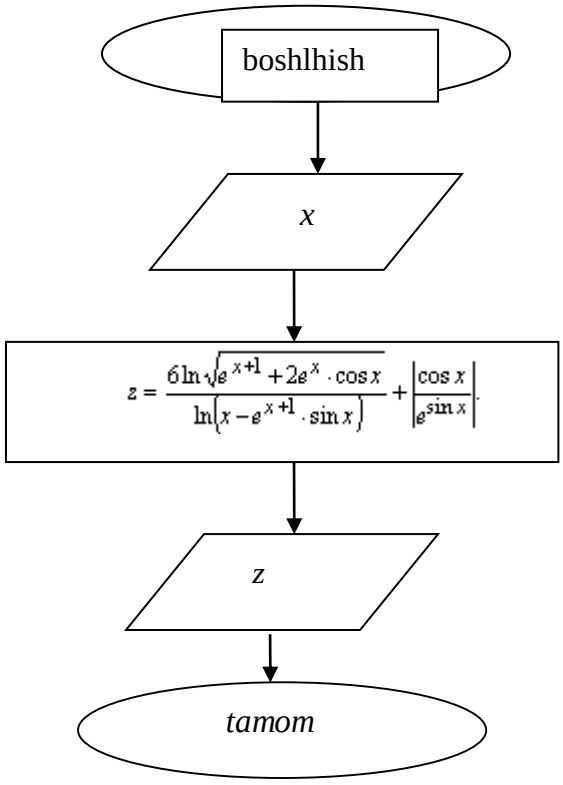
- ✓ Arifmetik amallar (qo‘shish, ayirish, ko‘paytirish, bo‘lish, butun bo‘lish, qoldiqni hisoblash);
- ✓ Matematik funktsiyalar (ildiz topish, natural logarifm, trigonometrik funksiyalar, ko‘rsatgichli funksiyalar va boshqalar).

Misol 1. Chiziqli jarayon. Berilgan funktsiyani xisoblang

$$z = \frac{6\ln\sqrt{e^{x+1} + 2e^{x} \cdot \cos x}}{\ln\left(x - e^{x+1} \cdot \sin x\right)} + \left|\frac{\cos x}{e^{\sin x}}\right|.$$

Aniqlash soxasini xisobga olgan xolda , blok sxemani tuzing, ifodani tugri C++ da avval ezvalib, dasturini ezib natijani oling

Blok sxema quydagi ko‘rinishga ega

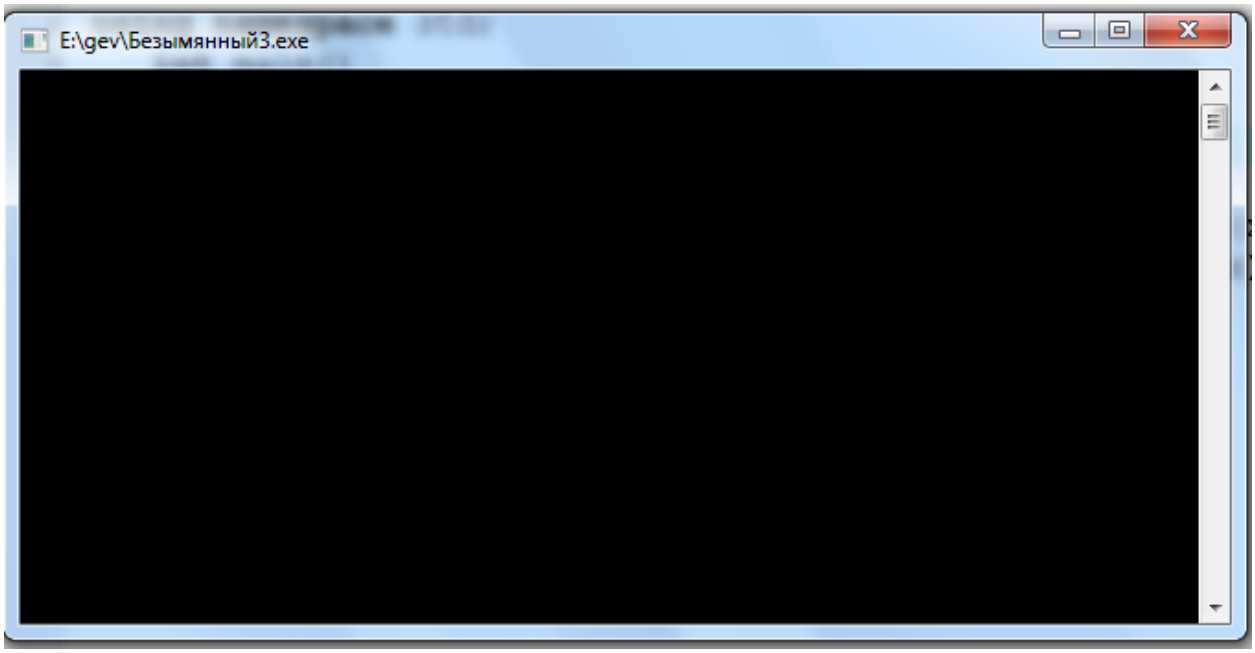


Rasm 6.1.

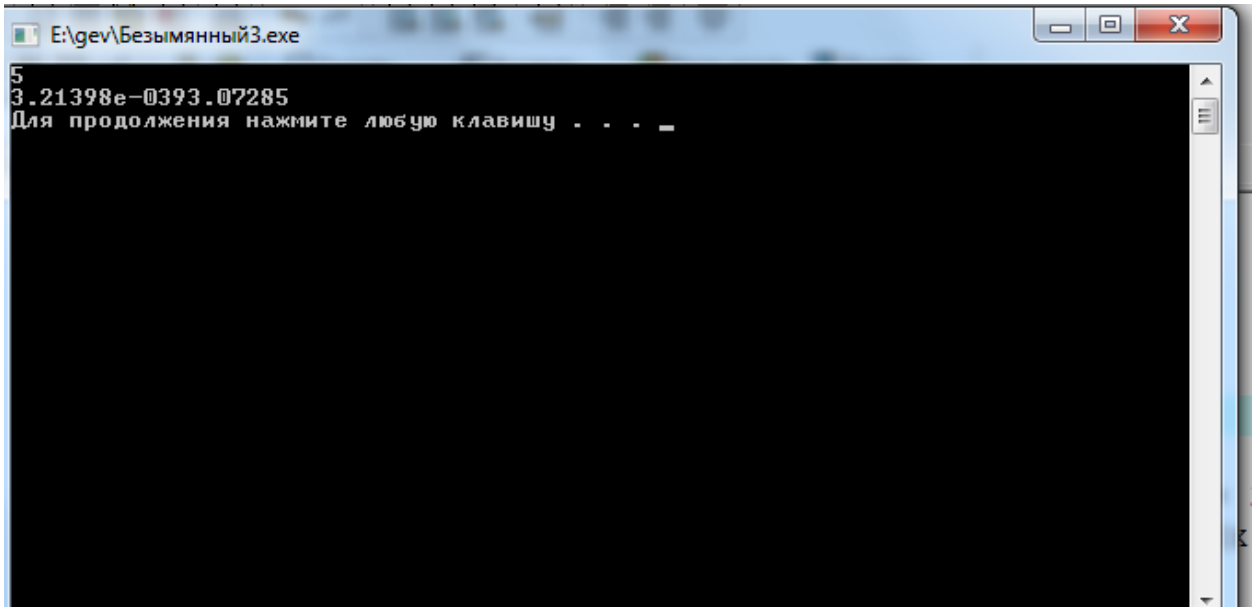
Dastur qoydagi ko‘rinishga ega

```cpp
#include <iostream>
#include <cmath>
 using namespace std;
    int main()
{
       float x,z;
           cin >> x;
       cout << z << 6 * log(sqrt(exp(x + 1) + 2*exp(x)*cos(x))) /
    log(x - exp(x + 3) * sin(x)) + fabs(cos(x) / exp(sin(x)))<< endl;

         system("PAUSE");
        return 0;
}

```

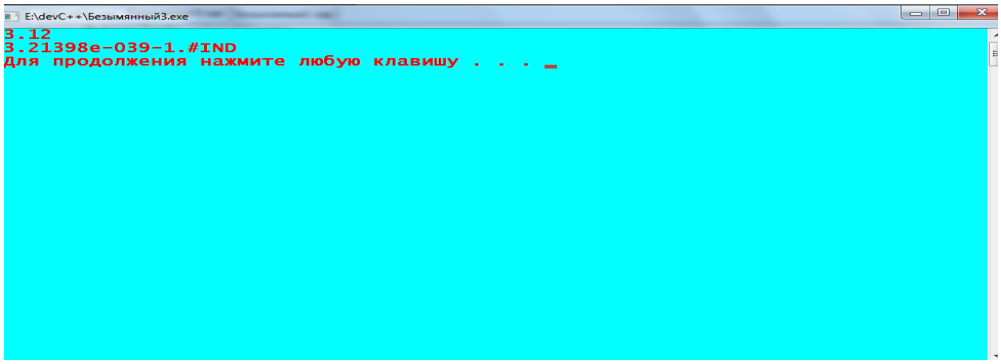
Rasm 6.2.



Rasm 6.3.



Rasm 6.4.

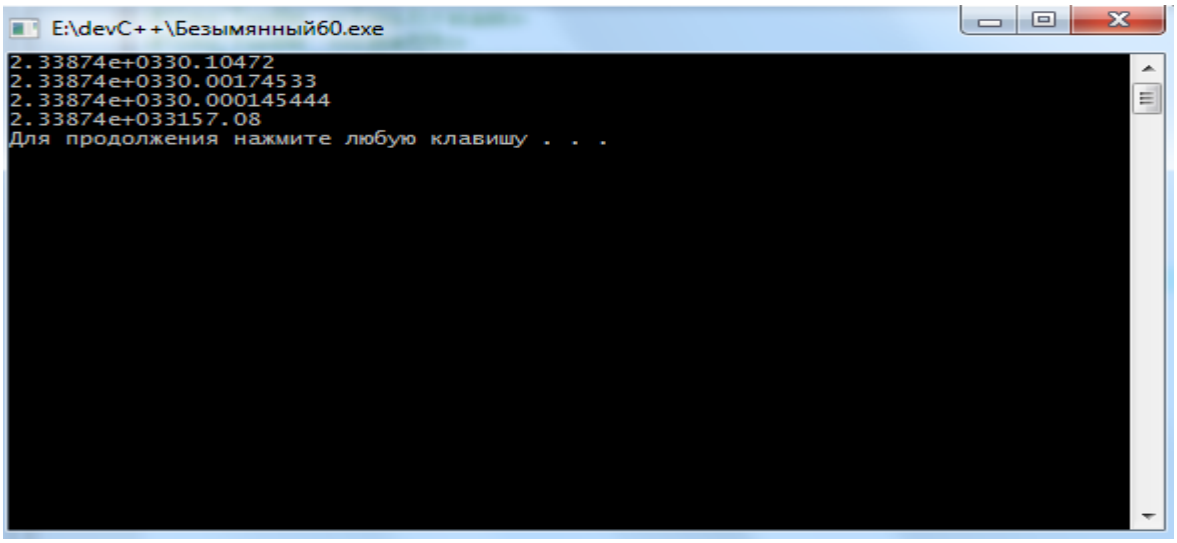


Rasm 6.5.

Misol 2. Burchak tezligini aniqlang:
1) soat soniya ko‘rsatkichi,
2) daqiqa soniya ko‘rsatkichi,
3) soat ko‘rsatkichi,
4) Er yuz o‘qi atrofida, schitaya, erning bir aylanmasi 24 soatdan iborat,
5) Lavalning bug’ turbinasi, aylanmasi 15000 daqiqada.
Masalani echilishi:
Burchakli tezlik:
1) coat soniya ko‘rsatkichi
W*60=2П unda w=2П/60=0,1047c^{-1}
2) daqiqa soniya ko‘rsatkichi
W*3600 =2П unda w=2П/3600=0,001745c^{-1}
3) soat ko‘rsatkichi
W*12*60*60=2П unda w= 2П/43200 =П/21600 =0,0001453
4) Er yuz o‘qi atrofida, schitaya, erning bir aylanmasi 24 soatdan iborat,
W*24*60*60=2П unda w= 2П/86400=0,0000727c^{-1}
5) Lavalning bug’ turbinasi, aylanmasi 15000 daqiqada.
15000*2П bu 60 sekunda w=30000 П/60=50 П=1571c^{-1}
Dastur qoydagi ko‘rinishga ega

```
 0 #include <iostream>
 1 #include <cmath>
 2 #define PI 3.14159265
 3  using namespace std;
 4 int main()
 5 {
 6   float w;
 7
 8   cout << w << 2*PI/60 << endl;
 9   cout << w << 2*PI/3600 << endl;
10   cout << w << 2*PI/43200 << endl;
11   cout << w << 50*PI << endl;
12    system("PAUSE");
13   return 0;
14 }
15
```

Rasm 6.6.



Rasm 6.7.

Misol 3. Nazariy mexanika masalasi.
Berilgan: **x=asinkt**
y=acos kt
z=vt
a,k, v –const
F(x,y,z) =? S=f(t) =?
Echilishi

$$\sin^2 kt = \frac{x^2}{a^2}$$

+

$$\cos^2 kt = \frac{y^2}{a^2}$$

$$1 = \frac{x^2}{a^2} + \frac{y^2}{a^2}$$ yoki $a^2 = x^2 + z^2$

Ko‘rinib turibdi, gorizontal tekislikda elektronlar doira boylab xarakatlanadilar, qaysiki vertikal boylab konuniy to‘gri ko‘chadi va shunday formulaga to‘gri keladi **z= vk**. Hulosa qilib aylana tasma simon traektoriyani xosil qiladi.
Harakat qonunini aniqlaymiz:

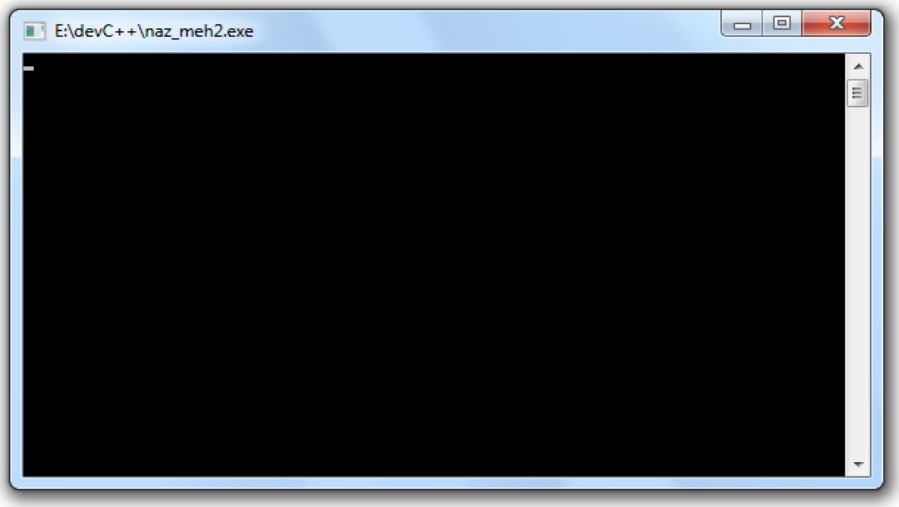
$v_x = ak\cos kt$, $v_y = -ak\cos kt$, $v_z = \nu$

$v = \sqrt{v_x^2 + v_y^2 + v_z^2} = \sqrt{a^2k^2 + \nu^2}$ unda $s = \sqrt{a^2k^2 + \nu^2} \bullet t$

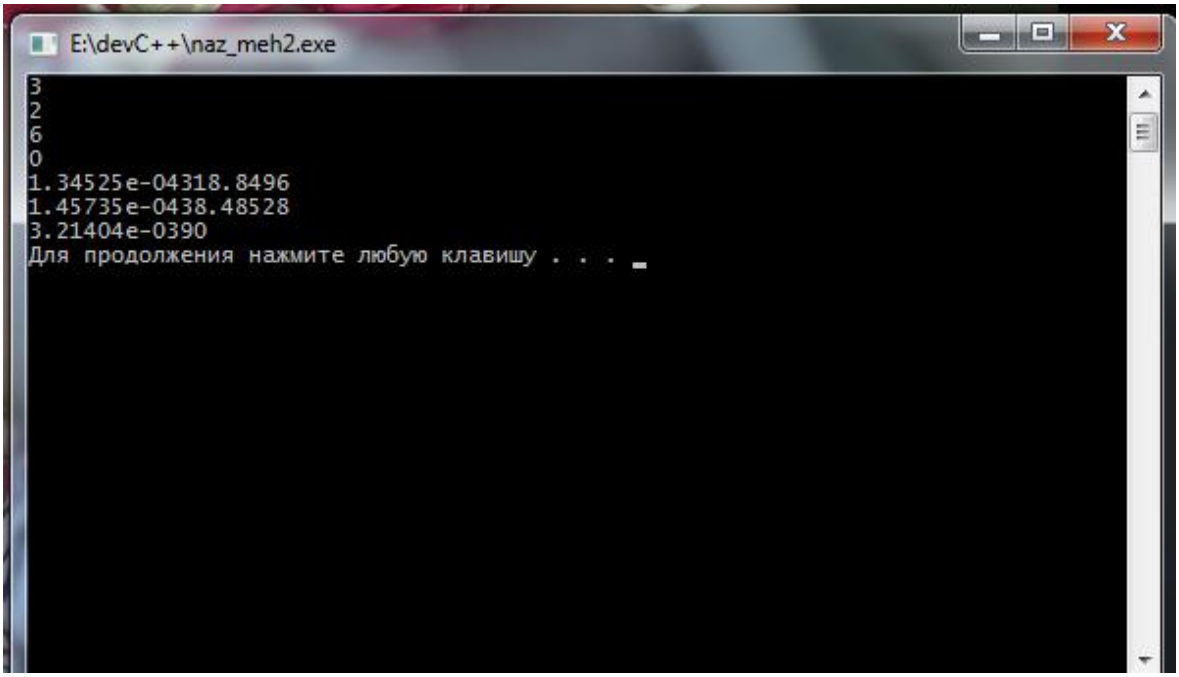
Boshlang'ich daqiqada t=0, x=0, y=a, z=0 Qadami $h = \frac{2\pi}{k}\nu$

Dastur qoydagi ko'rinishga ega

```
#include <iostream>
#include <cmath>
#define PI 3.14159265
 using namespace std;
    int main()
{
      float a,k,v,t,h,f,s;
      cin >> a >> k >> v >> t;
      cout << h << 2*PI/k*v << endl;
      cout << f << sqrt(pow(a,2)*pow(k,2)+pow(v,2)) << endl;
      cout << s << sqrt(pow(a,2)*pow(k,2)+pow(v,2))*t << endl;
system("PAUSE");
       return 0;
}
```



Rasm 6.8.

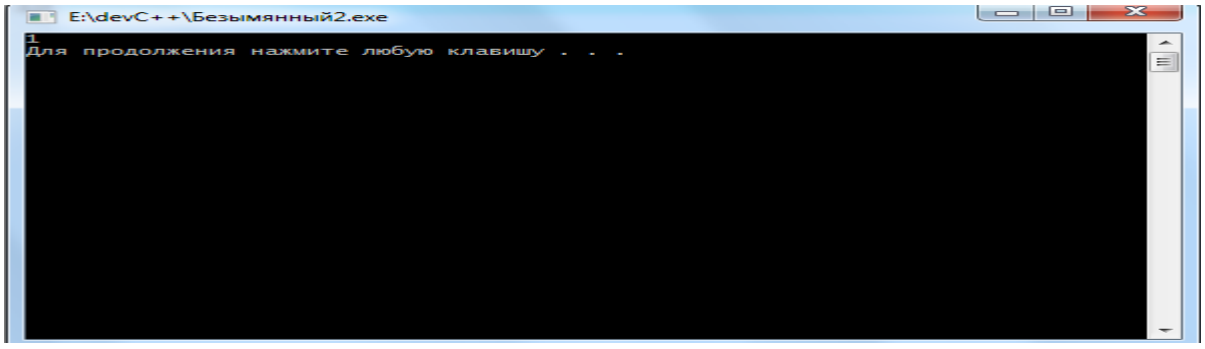


Rasm 6.9.

Turli xil chiziqli dasturlar

```
#include <cmath>
#define PI 3.14159265
 using namespace std;
int main()
{
  double param = 90.0;

  cout << sin(param*PI/180) << endl;

   system("PAUSE");
  return 0;
}
```

Rasm 6.10.



Rasm 6.11.

Zamonaviy Dasturlash tillarida murakkab ifodalarni hisoblash mos turlarni o‘zgartirish bilan registr xotirada translyator yordamida bajariladi. Lekin Dasturlashga o‘rgatish maqsadida o‘rgatish va Dasturlashning birinchi bosqichlarida formulalar boyicha hisoblash ketma-ketligiga

e’tibor berish tavsiya etiladi. Undan tashqari, turlarning o‘zgarishini kuzatish (ma’lumotlar turlari keyinroq ko‘rib o‘tiladi), kiritilgan ma’lumotlarning xatoligini va mos ravishda olingan natijaning to‘g’ri ishonchli raqamlari sonini (yoki xatoligini) baholash foydalidir.

7- LABORATORIYA ISHI
C++ ALGORITMIK TILNING TARMOQLANISH OPERATORLAR. DASTURLARI BILAN ISHLASH.

Maqsad: C++ dasturlash tilida tarmoqlanuvchi tarkibli algoritmlarda, shartning bajarilishi yoki bajarilmasligiga qarab qaysi punktlar ketma-ket bajarilishi aniqlanadi.

Topshiriqlar:
1.Tarmoqlanuvchi masalaning qoyilishi.
2. Tarmoqlanuvchi algoritmi(blok-sxema ko‘rinishida)ni tuzish.
3. C++ tilida tarmoqlanuvchi dastur tuzish.
4. Berilgan topshiriq varianti boyicha kompyuterga kiriting.
5. Ish bo‘yicha hisobot tayyorlang.

Nazariy qism:

Tarmoqlanuvchi jarayonda bir necha operatorlar ketma- ketligidan shart bajarilishiga qarab bitta operator tanlab olinadi. Bu ko‘rinishdagi dasturlarni tizim uchun shartsiz, shartli va tanlash operatorlaridan foydalaniladi.
Shartsiz o‘tish operatori. Bu operatorning qadimiy ko‘rinishi qoyidagicha bo‘ladi:
bo‘lganidek, murakkab konstruktsiyalar bo‘lishi mumkin.
dofo “belgi”;
Shartli operator

Dasturda shohlanishlarni tashkil qilish uchun, ya’ni ayrim faktorlarga bog’liq holda turli xatti-harakatlar bajarilishi uchun, if operatori qo‘llanadi.
Operator quyidagi formatga ega:
if (ifoda){operator-1;}[else{operator-2;}]
if operatorining bajarilishi ifodani hisoblashdan boshlanadi. Keyin bajarilish quyidagi sxema boyicha amalga oshiriladi.:
agar ifoda haqiqiy bo‘lsa (ya’ni noldan dan boshqa), bu holda operator-1 bajariladi.
agar ifoda sohta bo‘lsa (ya’ni 0 ga teng), bu holda operator-2 bajariladi.
agar ifoda sohta bo‘lsa-yu, operator-2 bo‘lmasa (shart bo‘lmagan konstruktsiya kvadrat qavslar ichiga olingan), bu holda if dan keyin turgan operator bajariladi.
Misol:

```
If (i<j)
{
i++;
}
Else
{
j=i-3;
i++;
}
```

Bu misol yana shuni ham ko‘rsatadiki, operator-1 o‘rnida, xuddi operator-2 o‘rnida Solib qoyilgan if operatorlaridan foydalanishga ham yo‘l qoyiladi. if operatori if konstruktsiyasi tarkibiga yoki boshqa if operatorining else konstruktsiyasiga kiritilgan bo‘lishi ham mumkinga.
Misollar:

```
int t=2;
int b=7;
int r=3;
if(t>b)
{
if(b<r)
{
r=b;
}
}
Else
{
r=t;
return (0);
}
```

Ushbu dasturning bajarilishi natijasida r=2 bo‘ladi.

Bunda dasturning bajarilishi jarayoni **doto** xizmatchi so‘zidan keyin yozilgan belgidan davom etadi. Bundan tashqari, shartsiz o‘tish operatorida ishlatiladigan **belgi label** xizmatchi so‘ziyordamida dastur salahasida tasvirlab qoyilishi lozim.

Shartli o‘tish operatori. Shartli o‘tish operatori berilgan biror shartning bajarilishi yoki bajarilmasligiga qarab operatordan birini tanlashga imkon beradi. Bunda tanlash dastur umumiy ko‘rinishlari qoyidagicha bo‘ladi:

if (ifoda){operator-1;} **1 kurinishi**

if (ifoda){operator-1;}[else{operator-2;}] **2 kurinishi**

1) Ko‘rinishidagi operator agar **<shart>** o‘rnidagi mantiqiy ifodaning qiymmati true (past) bo‘lsa u holda then xizmatchi so‘zidan keyingi operatorni aks xolda shartli o‘tish operatoridan keyingi operatorga boshqarishni o‘tkazish uchun ishlatiladi. Shartli o‘tish operatorining bu ko‘rinishi to‘liqsiz o‘tish operatori deb ataladi.
2) Ko‘rinishdagi operator shartli o‘tish operatorining to‘liq ko‘rinishi deb ataladi. Bu operator ishlatiladigan then va else xizmatchi so‘zlardan keyin yozilgan ikki operatordan biri tanlab olinadi. Bunda agar **<shart>** o‘rnidagi mantiqiy ifodaning qiymati rost bo‘lsa u holda then dan keyingi operator, aks xolda esa, else dan keyingi operator bajariladi.

Tanlash operatori (Case). Ma’lumki, shartli o‘tish operatorida berilgan shartning bajarilishi-bajarilishmasligiga qarab ikki xoldan bittasi ya’ni then dan yoki else dan keyingi operator tanlanar edi.

Ba’zan shunday masalalar uchraydiki, shartning bajarilishi-bajarilmasligiga qarab, bir nechta operatorlardan (ikki yoki undan ortiq) birini tanlashga to‘g’ri keladi. Buni yo‘qoridagi shartli operatorlardan foydalanib ham amalga oshirish mumkin. Lekin bunday dastur foydalanuvchi uchun ham o‘qitilishi noqulay, ham hajmi katta bo‘ladi.

C++ dasturlash tilida uni qulay ko‘rinishida yozish operatori mavjud bo‘lib, qiymatiga qarab tarmoqlanishga berilgan bir necha hollardan faqat bittasigina tanlab olinadi. Bu operatorning umumiy ko‘rinishi qoydagicha bo‘ladi.

```
Switch < ifoda >
Case <ifoda>of
<Berilganlar royxati>: <operatorlar>;
END;
```

Operatorda ifoda yani tinlovchi sifatida olingan ifodaning qiymati butun, satrli **(belgili),** mantiqiy yoki foydalanuvchi tomondan aniqlangan, chegaralangan va sanab o‘tiladigan turlardan biri bo‘lishi mumkin.

Bu operator bajarilganda dastavval **<ifoda>** qiymati aniqlanadi. Shundan so‘ng uning qiymati belgilar royxatida berilgan qaysi belgining qiymati bilan ustma - ust tushsa, shu belgili

operator bajariladi. Bu operator bajarilib bo‘lgandan keyin boshqarish shu tanlash operatordan keyingi operatorda keyilgi operatorga uzatiladi. Agar ifadaning qiymati belgilangan birontasi bilan ham ustma-ust tushmasa u holda bu operator aniqlanmagan bo‘ladi. Belgilar operatorlardan ikki nuqta **(:)** bilan ajratib yoziladi. Ifoda qiymatining **turi, belgi turi** bilan bir xil bo‘lishi kerak.

USLUBIY KO‘RSATMA. TARMOQLANISH JARAYONI

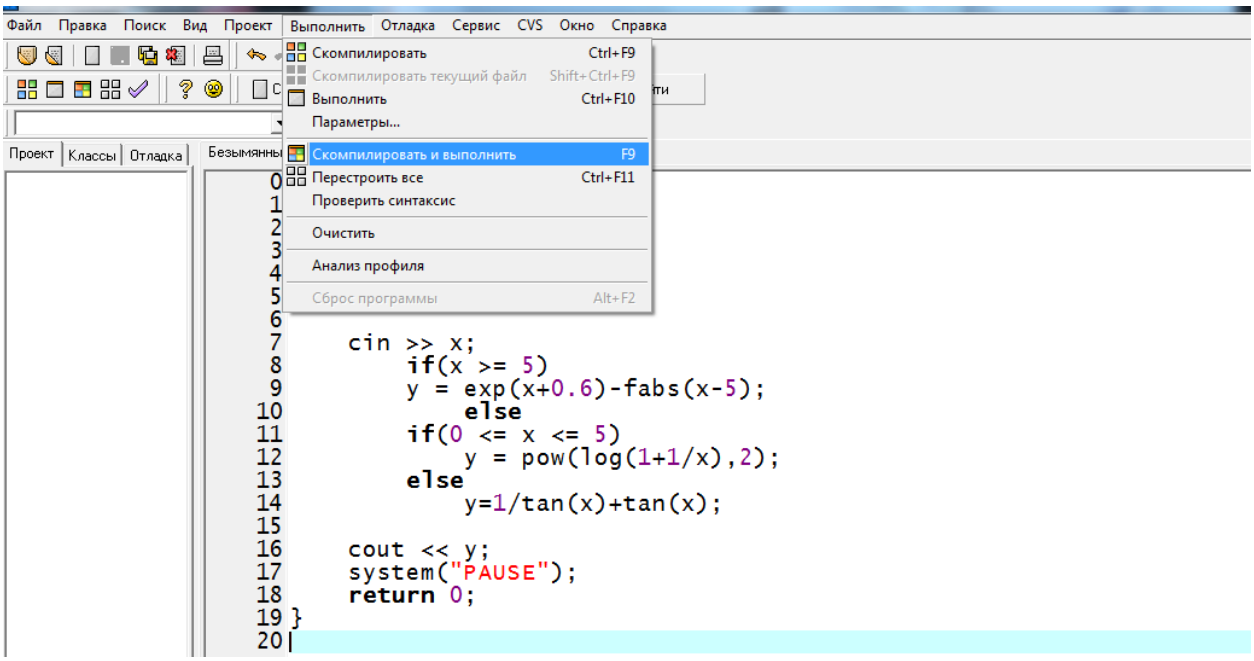
$$y = \begin{cases} e^{x+0,6} - |x-5| & , \quad agar \quad x \geq 5 \\ \ell n^2 (1+\frac{1}{x}) & , \quad agar \quad 0 < x < 5 \\ ctg\ x + tgx & , \quad agar \quad x \leq 0 \end{cases}$$

Dev C++ dagi dastur quydagi ko‘rinishga ega

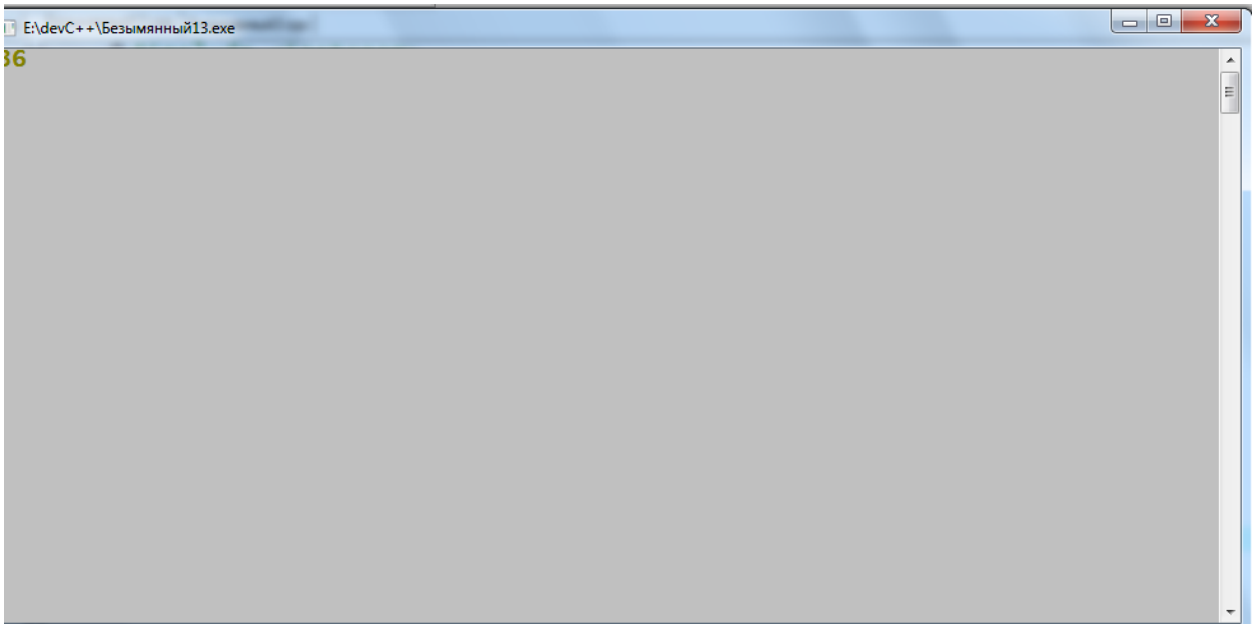
```
 0 #include <iostream>
 1 #include <cmath>
 2  using namespace std;
 3  int main()
 4 {
 5       double x,y;
 6
 7     cin >> x;
 8          if(x >= 5)
 9          y = exp(x+0.6)-fabs(x-5);
10              else
11          if(0 <= x <= 5)
12              y = pow(log(1+1/x),2);
13          else
14              y=1/tan(x)+tan(x);
15
16     cout << y;
17     system("PAUSE");
18     return 0;
19 }
20
```

Rasm 7.1.

So‘ng dasturni bajarishga beramiz



Rasm 7.2.



Rasm 7.3.

8- LABORATORIYA ISHI
C++ ALGORITMIK TILNING TAKRORLANISH OPERATORLAR. DASTURLARI BILAN ISHLASH.

Maqsad: Takrorlanuvchi (siklik) tarkibli algoritmlarda ularning biror-bir bo‘lak punktlari parametrlarning qabul qilish qiymatiga qarab ketma-ket takroran bir necha marta bajarishni dasturini tuzishni o‘rganish.

Topshiriqlar:
1. Takrorlanuvchi (siklik) masalaning qoyilishi;
2. Takrorlanuvchi (siklik) algoritmi(blok-sxema ko‘rinishida)ni tuzish;
3. C++ tilida takrorlanuvchi (siklik) dastur tuzish;
4. Kompyuterda natija olish va hisobot yozish.

Nazariy qism

Ko‘pgina takrorlanuvchi elementlarga mos algoritmga mos dastur kodini yozish uchun quyidagi buyruqlar yordamida hosil qilinadigan siklik strukturalarni ishlatishga to‘g’ri keladi.
for buyrug’i
for buyrug’i - sikllarni tashkil qilishning eng umumiy (ommaviy) usulidir. U quyidagi ko‘rinishga ega:
for (1-ifoda; 2-ifoda; 3-ifoda) {tana}.
1-ifoda odatda siklni boshqaruvchi o‘zgaruvchining boshlang’ich qiymatini o‘rnatish uchun ishlatiladi. 2-ifoda sikl tanasi bajarilishi kerak bo‘lgan shartni ifodalaydi. 3-ifoda sikl tanasining bajarilganidan keyin o‘zgaruvchining o‘zgarishini boshqaradi.
for buyrug’ining bajarilish sxemasi quyidagicha:

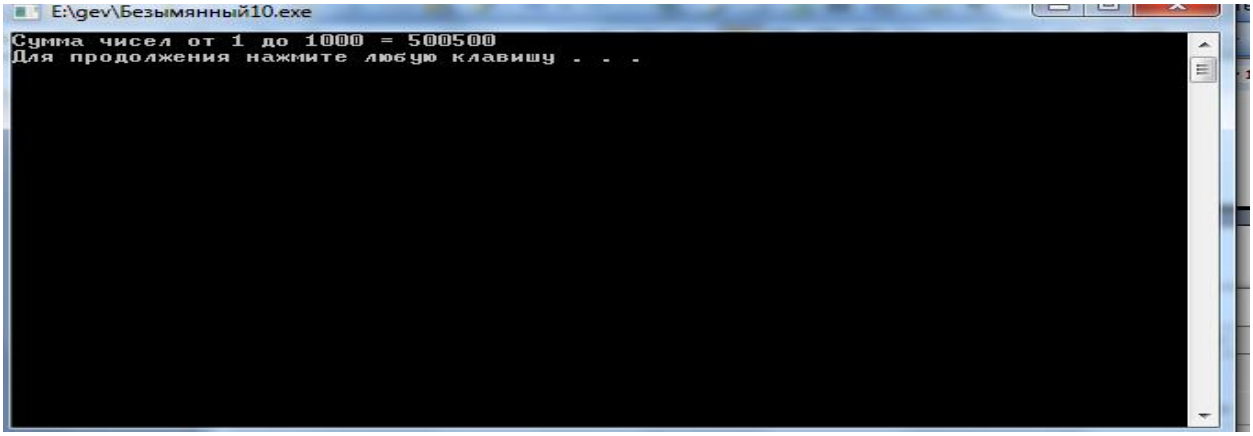
1. 1-ifoda hisoblanadi.
2. 2-ifoda hisoblanadi.
3. Agar 2-ifoda noldan farqi (rost) bo‘lsa, u holda sikl tanasi bajariladi. So‘ngra 2-ifoda bajariladi va boshqarish 2-punktga uzatiladi. Agar 2-ifodaning qiymati nol (yolg’on) bo‘lsa, u holda boshqarish for buyrug’idan keyingi buyruqqa uzatiladi.

Shu narsa ahamiyatliki, shartni tekshirish har safar sikl boshida bajariladi. Bu narsa esa bajarish sharti boshidayoq nolga teng bo‘lganda sikl tanasining biror marta ham bajarilmasligini bildiradi.

Misol 1. 1 dan 1000 xamma soni yigindisini xisobliydigan dasturni tuzamiz.

```
0  #include <iostream>
1  using namespace std;
2
3  int main()
4  {
5      int i;
6      int sum = 0;
7      setlocale(0, "");
8      for (i = 1; i <= 1000; i++)
9      {
10         sum = sum + i;
11     }
12     cout << "Сумма чисел от 1 до 1000 = " << sum << endl;
13     system("pause");
14     return 0;
15 }
16
```

Rasm 8.1.



Rasm 8.2.

Belgilar satrini teskari tartibda yozuvchi bu misolda siklni boshqarish uchun ikkita top va bot o‘zgaruvchilari ishlatiladi. Shuni ta’kidlash lozimki, bu erda 1- va 2- ifodadal o‘rnida ketma-ket bajariluvchi va bergul bilan adratilib yozilgan bir nechta ifodalar ishlatilgan.

for buyrug’ini ishlatishning boshqa varianti cheksiz sikl tashkil qilishdir. Bunday siklni tashkil etish uchun bo‘sh shartli ifodalarni ishlatish mumkin. Sikldan chiqish uchun esa odatda qo‘shimcha shartlar yoki break buyrug’i ishlatiladi (bu buyruq keyinroq ko‘riladi).

Masalan:

1.for (;;)

{

...

... break;

...

}

C tilining sintaksisiga binoan buyruq ham, for buyrug’ining tanasi ham bo‘sh bo‘lishi mumkin. Buyruqning shakli izlashlarni tashkil etishda qo‘llanilishi mumkin.

2.for (i=0; t[i]<10 ; i++);

Bu misolda sikl o‘zgaruvchisi bo‘lgan i o‘zgaruvchi qiymati 10 dan kichik bo‘lmagan t massiv birinchi elementi nomerining qiymatini qabul qiladi.

.1 While buyrug’i

while sikl buyrug’i sharti oldindan berilgan sikl buyrug’i deyiladi va quyidagi ko‘rinishga ega:

while (ifoda) {tana};

Ifoda sifatida C tilining ixtiyoriy ifodasini ishlatish mumkin. Tana sifatida ixtiyoriy buyruqni, jumladan bo‘sh va tarkibli (murakkab) buyruqlarni ham, ishlatish mumkin. hile buyrug’ining ishlash sxemasi quyidagicha:

1. Ifoda hisoblanadi.
2. Agar ifoda yolg’on bo‘lsa hile buyrug’ining bajarilishi tugallanadi va boshqarish navbatdagi buyruqqa uzatiladi, aks holda hile buyrug’ining tanasi bajariladi.
3. Jarayon 1-punktdan davom ettiriladi.

Quyidagi ko‘rinishdagi sikl buyrug’i

for (1-ifoda; 2-ifoda; 3-ifoda) {tana};

while buyrug’i bilan quyidagicha almashtiriladi:

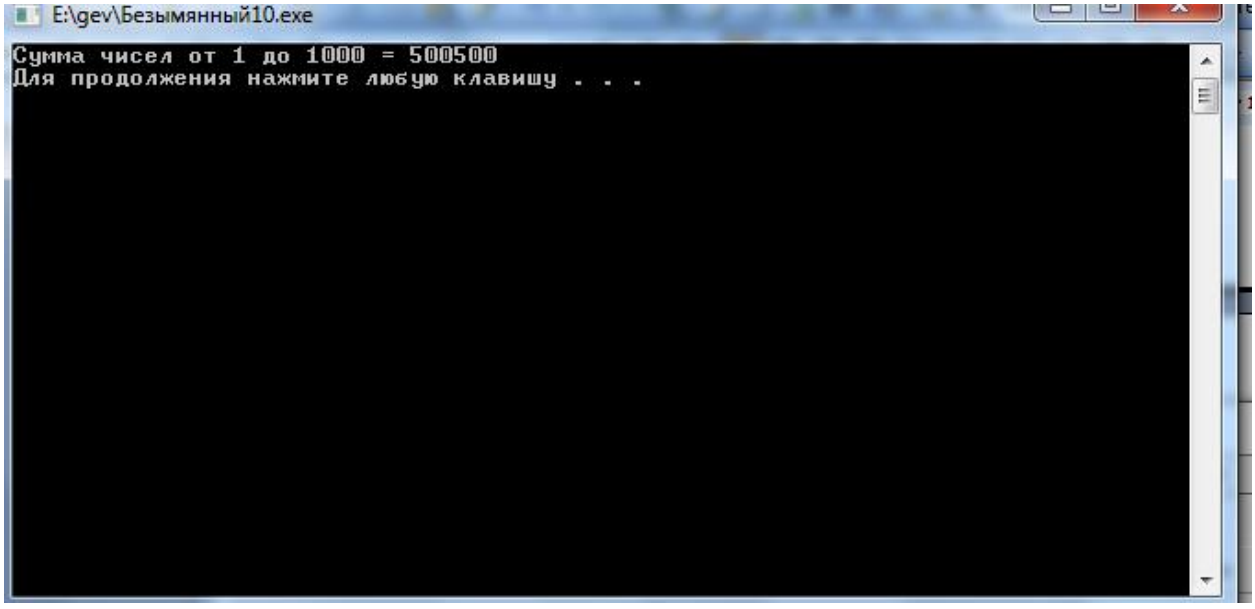
1-ifoda;

while (2-ifoda)

{

tana
3-ifoda;
}
for buyrug’ining bajarilishidagi kabi while buyrug’ida ham avvalo shartning bajarilishi tekshiriladi. Shuning uchun ham buyruq tanasini bajarish shart bo‘lmagan hollarda while buyrug’idan foydalanish qulay.
for va while buyruqlarining ichida ma’lum mos turlar bilan e’ln qilingan lokal o‘zgaruvchilarni ishlatish mumkin.
Misol 2. 1 dan 1000 xamma soni yigindisini xisobliydigan dasturni tuzamiz.

```
 0 #include <iostream>
 1 using namespace std;
 2
 3 int main()
 4 {
 5     setlocale(0, "");
 6     int i = 0;
 7     int sum = 0;
 8     while (i < 1000)
 9     {
10         i++;
11         sum += i;
12     }
13     cout << "Сумма чисел от 1 до 1000 = " << sum << endl;
14     system("pause");
15     return 0;
16 }
17
```



Rasm 8.3.

do while buyrug’i

do while sikl buyrug’i sharti oxirida berilan sikl buyrug’i deyiladi va sikl tanasini kamida bir marta bajarish zarur bo‘lgan hollarda ishlatiladi. Bu buyruq quyidagi ko‘rinishga ega:
do {telo} while (virajenie);
do while buyrug’ining bajarilish sxemasi:

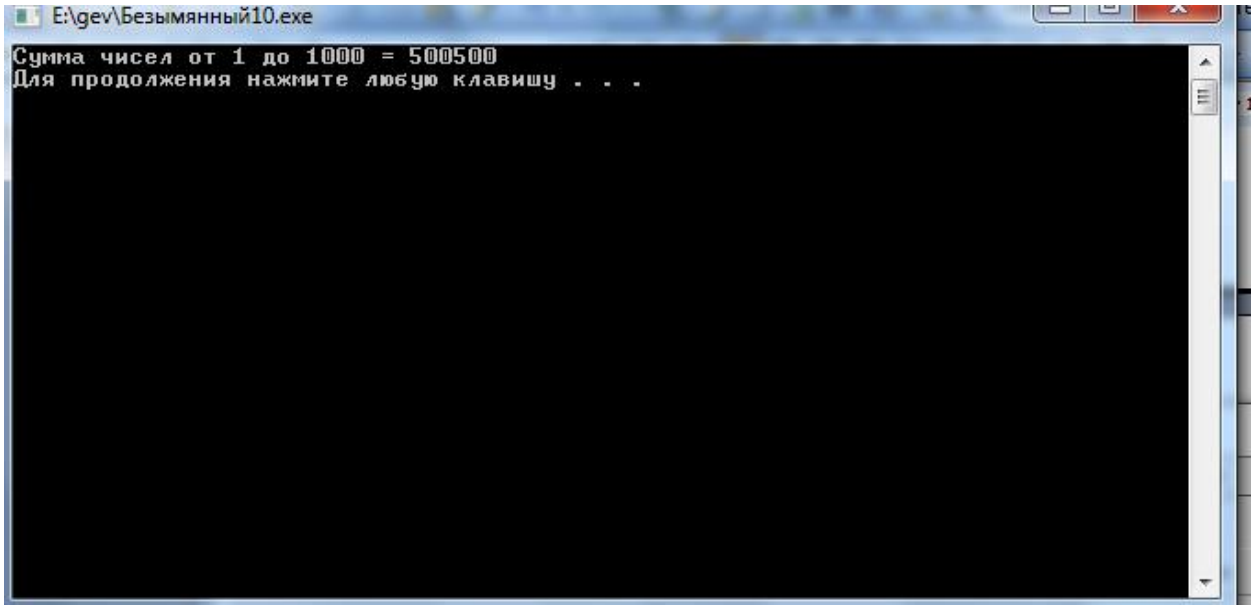
1. sikl tanasi bajariladi (tarkibli buyruq bo‘lishi ham mumkin).
2. Ifoda hisoblanadi.
3. Agar ifoda yolg’on bo‘lsa, u holda do while buyrug’ining bajarilishi tugallaniladi va navbatdagi buyruq bajariladi. Agar ifoda yolg’on bo‘lsa, u holda bajarish 1-punktdan davom ettiriladi.

while va do while buyruqlari ichma-ich joylashgan bo‘lishi ham mumkin.

3.Misol: 1 dan 1000 xamma soni yigindisini xisobliydigan dasturni tuzamiz.

```
 0 #include <iostream>
 1 using namespace std;
 2
 3 int main ()
 4 {
 5     setlocale(0, "");
 6     int i = 0;
 7     int sum = 0;
 8     do {
 9         i++;
10         sum += i;
11     } while (i < 1000);
12     cout << "Сумма чисел от 1 до 1000 = " << sum << endl;
13     system("pause");
14     return 0;
15 }
16
```

Rasm 8.4.



.

Rasm 8.5.

break buyrug’i

break buyrug’i birlashgan switch, do, for, while sikllardan eng ichkisining bajarilishi tugallanilishini ta’minlaydi. break buyrug’i bajarilgandan so‘ng boshqarish bajarilishi tugallangan sikldan keyingi buyruqqa uzatiladi.
Shu yo‘l bilan muddatidan avval sikldan chiqish ta’minlanadi.

Continue buyrug’i

continue buyrug’i ham break buyrug’i kabi faqatgina sikl buyruqlarinig ichida ishlatiladi. Ammo undan farqli ravishda bajarish bajarilishi tugatilgan sikldan keyingi buyruqdan emas, balki bajarilishi tugallangan sikldan boshlanadi.

Misol:

```
int a,b;
for (a=1,b=0; a<100; b+=a, a++)
{
if (b%2 != 0) continue;
 ...
/* juft yig’indilarni qayta ishlash */
}
```

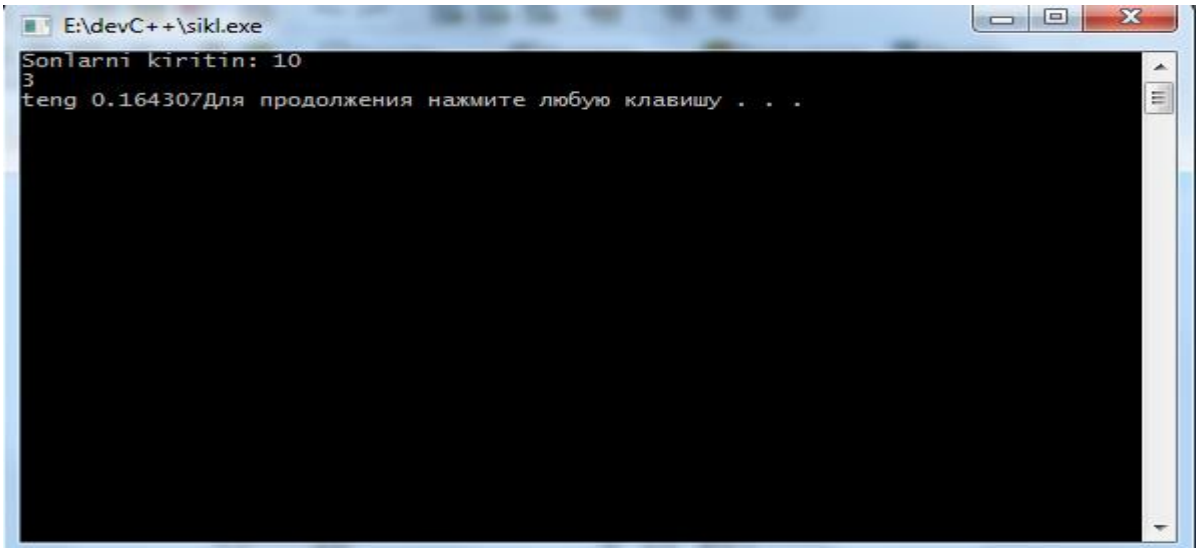
Bu misolda ko‘p nuqta bilan belgilangan amallar b ning toq qiymatlaridagina bajariladi. Chunki 1 dan a gacha sonlar yig’indisi toq bo‘lganda continue buyrug’i qayta ishlash buyruqlarini bajarmasdan, boshqarishni for siklining tanasini navbatdagi qiymat uchun bajarishga uzatadi. Continue buyrug’i ham break buyrug’i kabi ichma-ich sikllarning eng ichkisining ishini to‘xtatadi.

Misol 4. Berilgan butun n va xaqiqiy x. Xisoblang

$$\sum_{i=1}^{n} \sin^{i} x$$

```
0  #include <iostream>
1  #include <cmath>
2   using namespace std;
3
4      int main()
5      {
6           float S, X, Pr;
7           int N;
8           cout << "Sonlarni kiritin: ";
9           cin >> N >> X;
10          Pr = 1;
11          S = 0;
12          for(int i=1; i<=N; i++)
13          {
14               Pr *= sin(X);
15               S += Pr;
16          }
17
18          cout << "teng " << S;
19           system("PAUSE");
20         return 0;
21     }
22
```

Rasm 8.6.



Rasm 8.7.

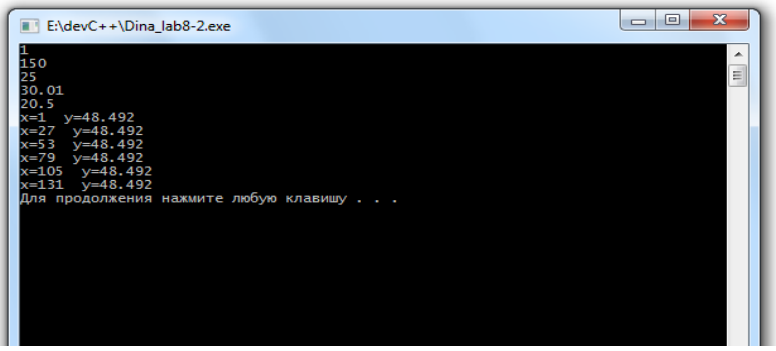
TAKRORLANUVCHI TUZILMALI MASALALAR UCHUN UCH XIL KO‘RINISHDAGI TAKRORLANUVCHI TUZILMALI ALGORITMLARNI TUZISH.

$$y = a * \lg|(b+x)^{1/3} + a| + tg\,75^0$$

$$a = 30{,}01; b = 20{,}5$$

$$x = 1(25)150$$

```
#include <iostream>
#include <cmath>
#define PI 3.14159265
using namespace std;
int main()
{
double param = 75.0;
float xn,xk,dx,a,b,y;
cin >> xn >> xk >> dx >> a >> b;

for(int x=xn; x<=xk; x++)
{
y =a*log10(fabs(pow((b+x),1/3)+a))+tan(param*PI/180);
 cout<<"x="<< x <<"   "<<"y="<< y << endl;
     x+=dx;
}
         system("PAUSE");
       return 0;
}
```



Rasm 8.8.

9- LABORATORIYA ISHI
C++ ALGORITMIK TILDA MASSIVLAR BILAN ISHLASH. BIR VA IKKI O‘LCHAMLI MASSIVLAR. DASTURLARI BILAN ISHLASH.

Maqsad: Bir va ikki o‘lchamli massivlar algoritmlarni C++ dasturi muhitida hisoblash jarayonlariga mos algoritm va dastur tizim boyicha talabalarda amaliy bilim va ko‘nikmalar hosil qilish.

Topshiriqlar:
1. Masalaning qoyilishi;
2. Hisoblash algoritmi(blok-sxema ko‘rinishida)ni tuzish;
3. C++ tilida dastur tuzish;
4. Kompyuterda natija olish va hisobot yozish.

Nazariy qism

MASSIV – bir xil tipdagi elementlar guruhi bo‘lib, bitta umumiy nom va xotiraga ega.
XOSSALARI:
- Barcha elementlari **bitta tipga** ega.
- Massiv **bitta nomga** ega.
- Barcha elementlar xotirada **ketma-ket** joylashtirilgan**.**

MISOLLAR:
- O‘quvchilar royxati.
- Ko‘p qavatli uydagi xonadonlar.
- Shaxardagi universitetlar.
- Yil boyicha havoning temperaturasi.

MASSIVLARNI E’LON QILISH.
MISOLLAR:

```
 int X[10], Y[10];
float zz, A[20];
char s[80];
```

Rasm 9.1.

BOSHLANG’ICH QIYMATLARNI BERISH:

```
int A[4] = { 8, -3, 4, 6 };
float B[2] = { 1. };
char C[3] = { 'A', '1', '0'
```

Rasm 9.2.

DASTUR.
Misol 1. Klaviaturadan massivni 5 ta elementini kiriting va ularni barchasini 2 ga ko‘paytiring hamda hosil bo‘lgan natijani yangi massivini chiqaring.

```
#include <stdio.h>
#include <conio.h>
main()
{
const int N = 5;
int A[N], i;
 // massiv elementlarini kiritish.
 // massivlarni qayta ishlash.
 // natijalarni chiqarish.
getch();
}
```

STATIK BERILGANLAR.

```
int x, y = 20;
float z, A[10];
char str[80];
```

Rasm 9.3.

Xar bir o‘zgaruchining nomi номи (massiv) bo‘ladi, o‘sha nom sifatida unga murojaat qilinadi.
O‘lchami oldindan ma’lum (dastur tuzayotganda aniqlanadi)
Xotira e’lon qilinganda ajratiladi.
Dastur ishlash davomida o‘lchamni o‘zgartirish mumkin emas.

Dinamik berilganlar.

O‘lchami oldindan noaniq, dastur ishlashi davomida aniqlanadi.
Xotira dastur ishlashi davomida ajratiladi.

Ko‘rsatkichlar.

Ko‘rsatkich – bu shunday o‘zgaruvchiki, boshqa o‘zgaruvchining adresini o‘zida saqlaydi.
E’lon :

```
char  *pC; // simvol adresi
          // ( yoki massiv e’loni )
int   *pI; // butun o‘zgaruvchi adresi
float *pF; // xaqiqiy o‘zgaruvchi adresi
```

Adres qanday yoziladi:

```
int m = 5, *pI;
int A[2] = { 3, 4 };
pI = & m;    //  m o‘zgaruvchi adresi
pI = & A[1]; // A[1] massiv adresi
pI = NULL;  // nol adresi yoki bo‘sh adresi
```

Berilganlarga murojaat qilish usullari.
Ko‘rsatkich orqali berilganlar bilan ishlash.

```
int m = 4, n, *pI;
pI = &m;
printf ("m = %d", * pI); // qiymatni chop etish
n = 4*(7 - *pI);         // n = 4*(7 - 4) = 12
*pI = 4*(n – m);         // m = 4*(12 – 4) = 32
printf("&m = %p", pI); // adresni chop qilish
```

Massivlar bilan ishlash.

```
int *pI, i, A[] = {1, 2, 3, 4, 5, 999};
pI = A;// A[0] adres xuddi A kabi yoziladi.
while ( *pI != 999 ) { // while( A[i] != 999 )
  *pI += 2; // A[i] += 2;
  pI++;     // i++ (keyinga elementga o‘tish)
  }
```

Ko‘rsatkichlarning eng muhim tushunchalari.

Ko‘rsatkichni e’lon qilayotganda, ko‘rsatayotgan o‘zgaruvchining turi aniqlangan bo‘lishi kerak va o‘zgaruvchi nomi oldiga *** (bir o‘lchovli), **(ikki o‘lchovli…) belgisi qoyilishi kerak**;

& belgi o‘zgaruvchining adresini ifodalaydi.(&m- m ning adresini oladi) ;

Dastur ichida ko‘rsatkiche’londagi ko‘rsatkich emas) oldiga qoyilgan * belgi ko‘rsatkich ko‘rsatayotgan obyektning(o‘zgaruvchi,o‘zgarmas) xotiradagi yacheykani ko‘rsatadi;

Xaqiqiy bo‘lmagan ko‘rsatkichni ifodalash uchun **NOL** (bosh ko‘rsatkich)konstantasi dan foydalaniladi;

Ko‘rsatkichning qiymatini n ga o‘zgartirish degani turdagi n- chi songa siljitish degan ma’noni anglatadi , masalan, butun sonlarda n*sizeof(int))

Ko‘rsatkich **%p format** yordamida chop qilinadi.

Dinamik massivlar qayerda ishlatiladi.

Misol 2. Massiv o‘lchamini kiriting va uning elementlarini kiriting. Massivni tartiblang va uni ekranga chiqaring.

Muammo:

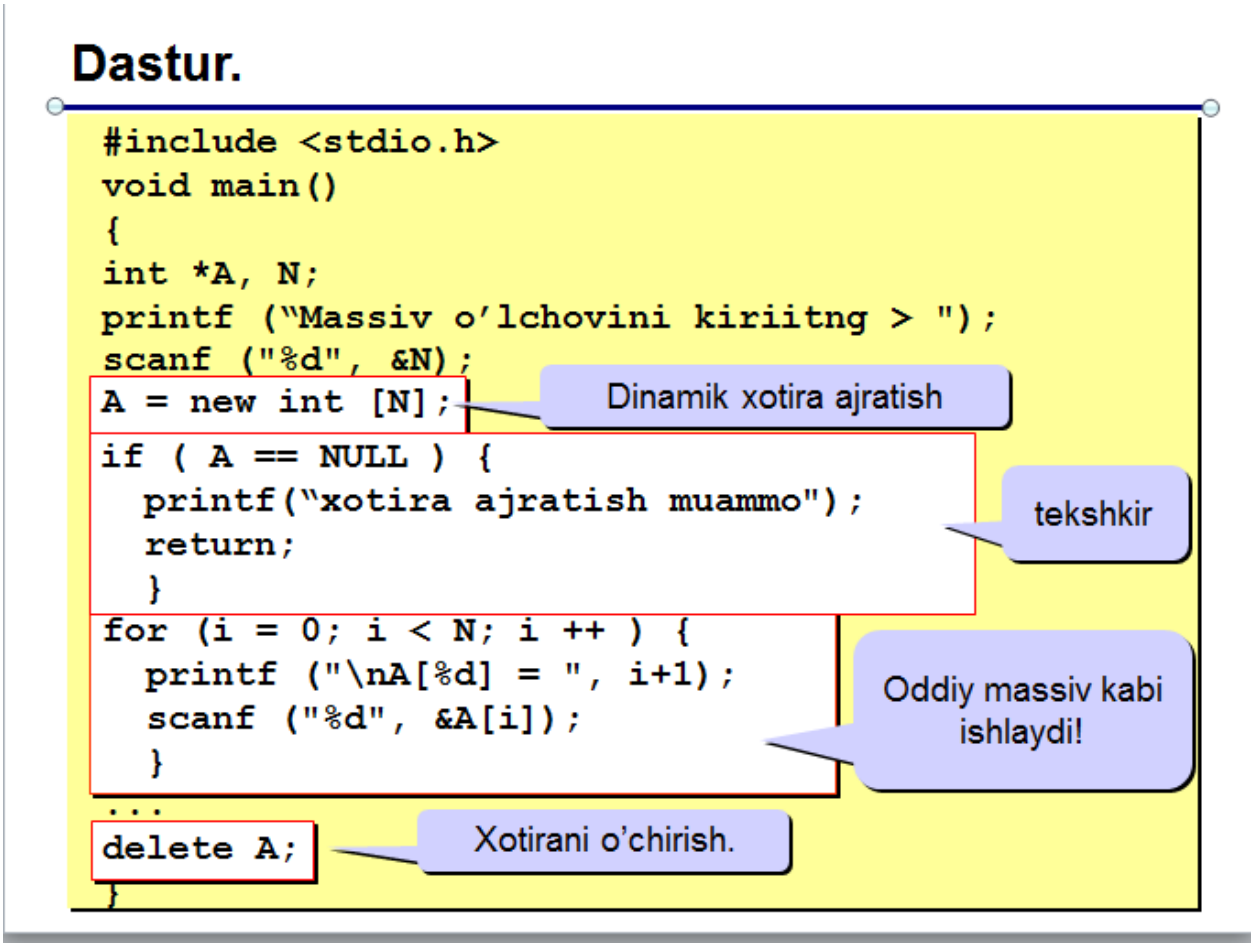
Massiv o‘lchami oldindan ma’lum emas.

Yechish usullari:

1) Xotirani ortig’I bilan ajratish.
2) Xotirani o‘lchov aniq bo‘lganda keragicha ajratish.

Algoritm:

1) Massiv o‘lchovini kiritish;
2) Xotira ajratish ;
3) Massiv elementlarini kiritish;
4) Massivni tartiblash va ekranga chiqarish;
5) Massivni xotiradan o‘chirish.



Rasm 9.4.

Dinamik massivlar.

C++tilida xotiradan joy ajratish uchun **malloc** va **calloc** funksiyalaridan foydalaniladi**.**
C++tilida **new operatoridan foydalaniladi**;

ko‘rsatkich = new tur [o‘lchami];

new operatori natijasini, ya’ni ajratilgan xotira bloki adresini ko‘rsatkichda saqlash kerak;
Agar **new** operatori (**NULL**) qiymatini qaytarsa, demak xotira ajratish amalga oshmaganligini bildiradi.;
Dinamik massiv bilan xam xuddi statik massiv kabi ishlanadi.
Dinamik xotirani bo‘shatish uchun **delete operatoridan foydalaniladi** :

delete ko‘rsatkich;

Xotira bilan ishlashdagi xatolar.

Xotiraning boshqa joyiga yozish:
Xotira ajratilmagan ammo massiv shu joydan foydalanmoqchi
Nima qilish kerak: ko‘rsatkichni NOL ga tekshirish kerak .
Massiv chegaralaridan chiqib ketishi:
massiv elementining indeksini xato berilishi bilan murojaat qilish, massivga elementlarni kiritayotganda chegaradan chiqib ketishi.
Nima qilish kerak: massivning chegaradan chiqib ketishini tekshiruvchi translyator funksiyasini ishlatish kerak. Ko‘rsatkich ikkinchimarta o‘chiriladi :
Xotira strukturasi buziladi.
Nima qilish kerak: o‘chirilgan ko‘rsatkichga NOL qiymatini berib tekshirish kerak.

10- LABORATORIYA ISHI.
C++ DASTURLASH TILINING GRAFIK IMKONIYATLARI. DASTURLARI BILAN ISHLASH.

Maqsad: EXCEL 2010 yordamida C++ da funktsiyalarning grafigini tuzishni o‘rganish va ko‘nikmalarini egallab o‘lish.

Qisqacha nazariy ma’lumotlar

Grafik dasturlarni dasturlash bu juda katta mavzu bo‘lib bu biz o‘rgatmoqchi bo‘lgan asosiy dasturlash tilidan ancha chiqib ketadi. Shunga qaramasdan har qanday dasturlash tilini o‘rganayotganda garchi ularga bitta misol keltirmasa bu qo‘niqarsiz bo‘ladi.

Grafik tuzishda harakatlarning ketma ketligi

1. Konsolga emas, faylga funktsiya va argument kiritilgan dastur yo‘zish. Argument va funktsiya o‘rtasidagi vergulni ko‘rib chiqing.

2. O‘lingan faylni Microsoft Office Word dasturida oching.

3.Ma’lumotlarni jadval ko‘rinishiga olib kelamiz **Вставка > Таблиsa > Преобразовать в таблиsy**, ajratuvchi sifatida argumentdan keyin vergul qoyish kerak.

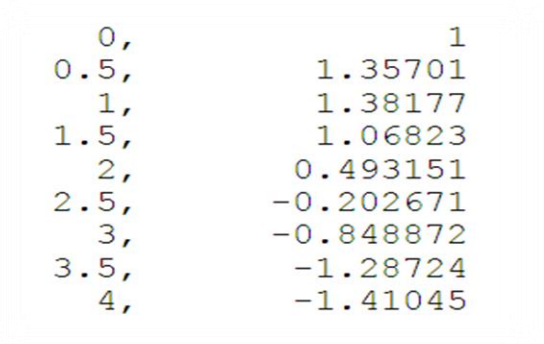
4. Excelga jadvalni ko‘chiramiz, va olingan ma’lumotlarda nuqta o‘rniga vergul qoyamiz **Главная > Найти и выделит > Заменить.**

5. Excelda grafik tuzamiz **Вставка > Точечная > Точечная с гладкими кривыми.**

Misol 1. y=sin(x)+cos(x) funktsiyasining grafigini tuzing

```
#include <iostream>
#include <fstream> //kiritish/chiqarishkutubxonasi
#include <math.h>
using namespace std;
double trig(double var); // funktsiyaprototipi trig
int main()
{
setlocale (0, "");
double a, b, h, x;
char s[20]; // fayl nomi uchun 20 ta belgidan iborat qator
cout << "argumentning boshlang’ich va o‘xirgi qiymatini yozing va qadam: ";
cin>>a>>b>>h;
cout<< "nomini yozing: ";
cin>>s;
ofstream f; //fayl yozuvini e’lon qilamiz
f.open(s); // faylni o‘chamiz
for (x=a; x<=b; x+=h)
{f.width(10);
 f << x <<","; /* faylga x argumentini yo‘zamiz va bir vaqtda argumentdan keyin vergul qoyamiz */
 f.width(15);
 f << trig(x) << endl; /*x argumentli funktsiyani chaqiramiz va hisob natijasini faylga yo‘zamiz*/
 }
f.close(); //faylni yopamiz
   return 0;
}
double trig(double var) {  // funktsiya trig
return sin(var)+cos(var);
}
```

Hisob-kitob
natijalari bilan
bo‘lgan fayl



```
   0,                1
 0.5,          1.35701
   1,          1.38177
 1.5,          1.06823
   2,         0.493151
 2.5,        -0.202671
   3,        -0.848872
 3.5,         -1.28724
   4,         -1.41045
```

Rasm 10.1.

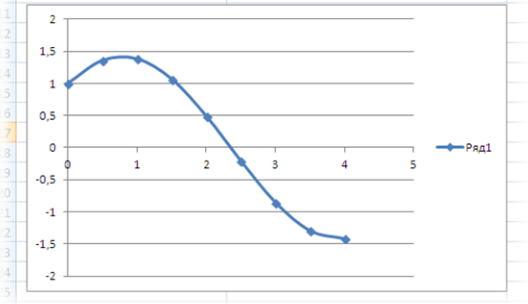
Natijalarni jadvalga aylantiramiz

0	1
0.5	1.35701
1	1.38177
1.5	1.06823
2	0.493151
2.5	-0.202671
3	-0.848872
3.5	-1.28724
4	-1.41045

Rasm 10.2.

Excelga jadvalni kochiramiz va sonlar o‘rtasidagi nuqtalarni vergulga almashtiramiz va grafik tuzamiz

0	1
0,5	1,35701
1	1,38177
1,5	1,06823
2	0,493151
2,5	-0,202671
3	-0,848872
3,5	-1,28724
4	-1,41045



Rasm 10.3.

Misol 2.(traektoriyani tuzamiz)

Top A nuqtaga yerga V1=6 m/s tezlikda tushmoqda. Tushish burchagi vertikaldan 30 grad. Har bir sakrashda top o‘zining 30 foiz tezligini yoqotadi, yani sakrash tezligini V2=0.7*V1 deb yozsak bo‘ladi.

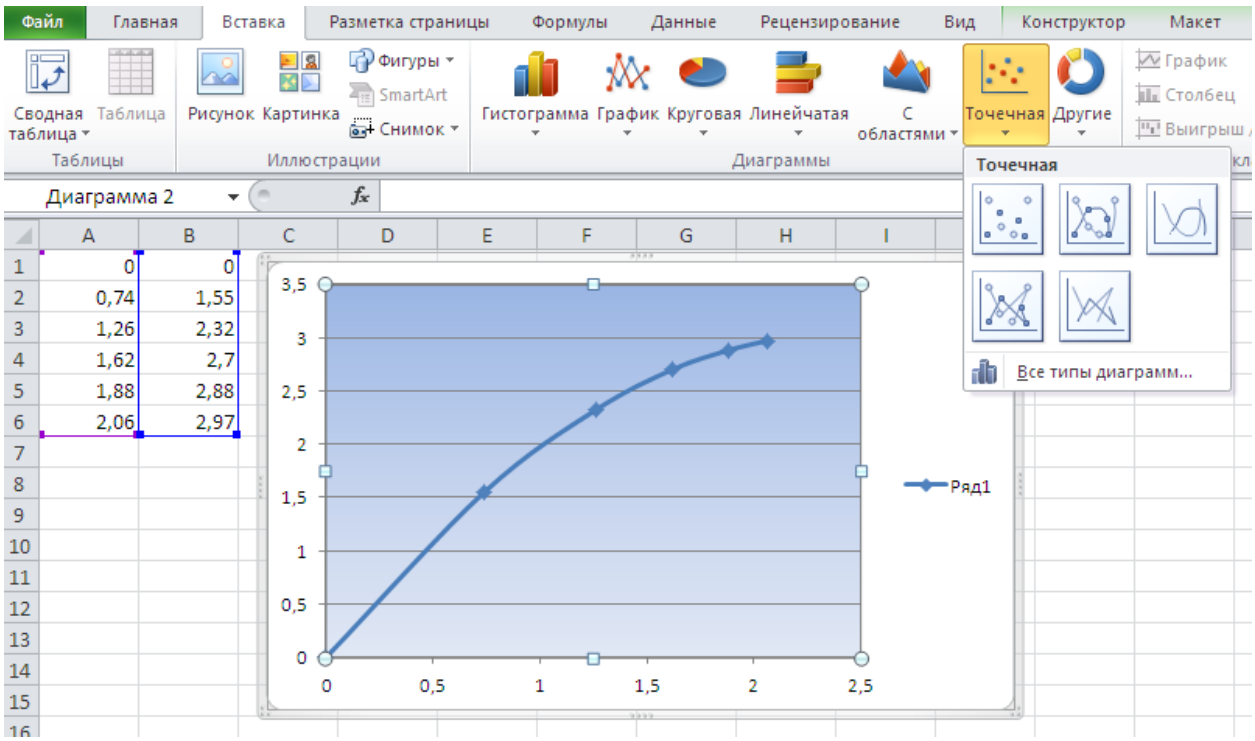
Sakrash buechagi tushish burchagiga teng. Ikkinchi va keying tushishda topning tezligi unnan o‘ldingi sakrash tezligiga teng. dasturni yozing va sakrash harakati traektoriyasini ko‘rsating. Sakrashlar so‘ni 6 ekranga topning $h = V_{2в}^2/2g$ teng deb olinsin. Sakrashda topning balandligi

Topning ikki sakrash o‘rtasidagi vaqti $t = 2V_{2в}/g$

Bu $V_{2в}$ - topning sakrash tezligi.

```
#include <iostream>
#include <cmath>
#include <fstream>     //faylga chiqarish uchun kutubxona
using namespace std;
double V1=6, g=9.80665, pi=3.14159;
int main()
{
setlocale(LC_ALL, "Russian");
char s[20];
double x, t, tm, dt, V2, Vx, Vy, Vys, h;
inti, j, N;
doublexp[7]; // sakrash nuqtalari uchun massiv koordinatalari
doubletp[7]; //sakrash vaqti
cout<< "faylni nomini yozing: ";
cin>>s;
ofstreamf;              // faylga kiritsh oqimini ko‘rsating
f.open(s);              // faylni o‘chish
tp[0]=0;
xp[0]=0;
```

```
cout<< "sonni yozing N: ";
cin>>N;  // N –sakrash intervali
for (i=0; i<=6; i=i+1) // sakrash nuqtalari tsikli
{
V2=0.7*V1;
Vy=V2*cos(pi/6);
Vx=V2*sin(pi/6);
tm=Vy/g; // sakrash vaqtida maksimal balandlikka ko‘tarilish vaqti
tp[i+1]=tp[i]+2*tm; //keying sakrashgacha vaqt
xp[i+1]=xp[i]+Vx*2*tm;  //keying sakrashgacha oraliq
dt=2*tm/N;           // vaqt boyicha qadam
for (j=0; j<=N; j=j+1) /* ikki qoshni sakrashlar o‘rtasidagi nuqtalar traektoriyasini qurishdagi tsikl */
{
if (j==0)
{
h=0;
x=xp[i];
t=tp[i];
Vys=Vy; //
}else
{
Vy=Vy-g*dt;
h=h+dt*(Vy+Vys)/2; /* o‘rtacha tezlik hisobda balandligi dt */
x=x+Vx*dt;
t=t+dt;
Vys=Vy;
}
f<<x<< ",  ";  //x koordinatasini faylga yozish
f<<h<<endl; //x koordinatasiga munosib balandlik
}
V1=V2; // sakrash va tushish tezliklarini yozamiz
cout << tp[i] << "  "<< xp[i] << endl;
}
f.close();       //faylni yopamiz
}
```


Файл
Главная
Вставка
Разметка страницы
Формулы
Данные
Рецензирование
Вид
Конструктор
Макет
Сводная таблица
Таблица
Рисунок
Картинка
Фигуры
SmartArt
Снимок
Гистограмма
График
Круговая
Линейчатая
С областями
Точечная
Другие
Таблицы
Иллюстрации
Диаграммы
Диаграмма 2
0 0
0,74 1,55
1,26 2,32
1,62 2,7
1,88 2,88
2,06 2,97
Ряд1
Все типы диаграмм...

Rasm 10.4.

I-II. AMALIYOT MASHG‘ULOT MAVZULARI
II. SEMESTR.
1-AMALIYOT ISHI
MATEMATIK MODELLARNI ELEKTRON JADVALIDAGI TATQIQOTI.

Maqsad: Talabalarga chiziqli algebraik tenglamalar sistemasini Gauss, Kramer, teskari matritsa, iteratsiya usullarida yechish algoritmlarini berish hamda bu usullarga Mathcad dasturida va elektron jadvalda ishlashga o‘rgatish.

Nazariy qism

Bizga n ta noma’lumli n ta chiziqli algebraik tenglamalar sistemasi

$$\begin{cases} a_{11}x_1 + a_{12}x_2 + ... + a_{1n} = b_1 \\ a_{21}x_1 + a_{22}x_2 + ... + a_{2n} = b_2 \\ ..... \\ a_{n1}x_1 + a_{n2}x_2 + ... + a_{nn}x_n = b_n \end{cases} \quad (1)$$

berilgan bo‘lsin. Bu yerda a_{ij}, b_i lar berilgan sonlar, x_i lar noma’lumlar (i,j=1,2,...,n). Agar (1) sistemaga mos keluvchi asosiy determenant 0 dan farqli, ya’ni

$$\begin{vmatrix} a_{11}\ a_{12}\ ...\ a_{1n} \\ a_{21}\ a_{22}\ ...\ a_{2n} \\ ..... \\ a_{n1}\ a_{n2}\ ...\ a_{nn} \end{vmatrix} \neq 0$$

bo‘lsa u yagona yechimga ega bo‘ladi.

Chiziqli algebraik tenglamalar sistemasini yechishning bir necha usullari mavjud bo‘lib, ulardan asosiylari Kramer, Gauss, teskari matritsa, iteratsiya usullaridir. Bu usullar algoritmlarini (1) sistema uchun ko‘rib chiqaylik.

Kramer usuli. Kramer usuli odatda determenantlar usuli ham deb ataladi. Bu usulning algoritmi quyidagicha. Dastlab quyidagi (n+1) ta n - tartibli

$$\Delta = \begin{vmatrix} a_{11}\ a_{12}\ ...\ a_{1n} \\ a_{21}\ a_{22}\ ...\ a_{2n} \\ ..... \\ a_{n1}\ a_{n2}\ ...\ a_{nn} \end{vmatrix} \quad \Delta_{x_1} = \begin{vmatrix} b_1\ a_{12}\ ...\ a_{1n} \\ b_2\ a_{22}\ ...\ a_{2n} \\ ..... \\ b_n\ a_{n2}\ ...\ a_{nn} \end{vmatrix} \quad ... \quad \Delta_{x_n} = \begin{vmatrix} a_{11}\ a_{12}\ ...\ b_1 \\ a_{21}\ a_{22}\ ...\ b_2 \\ ..... \\ a_{n1}\ a_{n2}\ ...\ b_n \end{vmatrix}$$

determinantlarning qiymatlari hisoblanadi va no‘malumlar

$$x_1 = \frac{\Delta_{x_1}}{\Delta},\ x_2 = \frac{\Delta_{x_2}}{\Delta}, ..., x_n = \frac{\Delta_{x_n}}{\Delta}$$

formulalar yordamida topiladi.

Misol 1. Quyidagi

$$\begin{cases} 2x_1 + x_2 - x_3 = 1 \\ x_1 - 4x_2 + 7x_3 = 14 \\ 5x_2 - 2x_3 = 4 \end{cases}$$

chiziqli algebraik tenglamalar sistemasini Kramer usuli yordamida yeching.

Yechish.

$$\Delta = \begin{vmatrix} 2 & 1 & -1 \\ 1 & -4 & 7 \\ 0 & 5 & -2 \end{vmatrix} = 2\cdot(-4)\cdot(-2) + 1\cdot 7\cdot 0 + 1\cdot 5\cdot(-1) - 0\cdot(-4)\cdot(-1) - 1\cdot 1\cdot(-2) -$$

$$-2\cdot 5\cdot 7 = 16 + 0 - 5 - 0 + 2 - 70 = -57$$

$$\Delta_{x_1} = \begin{vmatrix} 1 & 1 & -1 \\ 14 & -4 & 7 \\ 4 & 5 & -2 \end{vmatrix} = 1\cdot(-4)\cdot(-2) + 1\cdot 7\cdot 4 + (-1)\cdot 14\cdot 5 - (-1)\cdot(-4)\cdot 4 -$$

$$-1\cdot 14\cdot(-2) - 1\cdot 7\cdot 5 = 8 + 28 - 70 - 16 + 28 - 35 = -57;$$

$$\Delta_{x_2} = \begin{vmatrix} 2 & 1 & -1 \\ 1 & 14 & 7 \\ 0 & 4 & -2 \end{vmatrix} = 2\cdot 14\cdot(-2) + 1\cdot 7\cdot 0 + (-1)\cdot 1\cdot 4 - (-1)\cdot 14\cdot 0 - 1\cdot 1\cdot(-2) -$$

$$-2\cdot 7\cdot 4 = -56 + 0 - 4 - 0 + 2 - 56 = -114;$$

$$\Delta_{x_3} = \begin{vmatrix} 2 & 1 & 1 \\ 1 & -4 & 14 \\ 0 & 5 & 4 \end{vmatrix} = 2\cdot(-4)\cdot 4 + 1\cdot 14\cdot 0 + 1\cdot 1\cdot 5 - 1\cdot(-4)\cdot 0 - 1\cdot 1\cdot 4 -$$

$$-2\cdot 14\cdot 5 = -32 + 0 + 5 - 0 - 4 - 140 = -171;$$

$$x_1 = \frac{\Delta_{x_1}}{\Delta} = \frac{-57}{-57} = 1; \quad x_2 = \frac{\Delta_{x_2}}{\Delta} = \frac{-114}{-57} = 2; \quad x_3 = \frac{\Delta_{x_3}}{\Delta} = \frac{-171}{-57} = 3;$$

Javob: $x_1 = 1,\ x_2 = 2,\ x_3 = 3.$

Gauss usuli. Gauss usuli yoki no‘malumlarni ketma-ket yo‘qotish usuli chiziqli algebraik tenglamalar sistemasini aniq yechish usuli hisoblanadi. Bu usulining algoritmi quyidagi hisoblashlar ketma-ketligidan iborat.

$a_{11} \neq 0$ bo‘lsin (agar $a_{11} = 0$ bo‘lsa, sistemadagi tenglamalarning o‘rnini almashtirib $a_{11} \neq 0$ ga ega bo‘lish mumkin). (1) sistemadagi birinchi tenglamaning barcha hadlarini a_{11} ga bo‘lib

$$x_1 + a_{12}^{(1)} x_2 + ... + a_{1n}^{(1)} x_n = b_1^{(1)}$$

ni hosil qilamiz. Bu tenglamani ketma-ket $a_{21}, a_{31}, ..., a_{n1}$ larga ko‘paytirib, undan sistemaning keyingi tenglamalarini ayiramiz va

$$\begin{cases} x_1 + a_{12}^{(1)} x_2 + ... + a_{1n}^{(1)} x_n = b_1^{(1)} \\ a_{22}^{(1)} x_2 + ... + a_{2n}^{(1)} = b_2^{(1)} \\ ..... \\ a_{n2}^{(1)} x_2 + ... + a_{nn}^{(1)} x_n = b_n^{(1)} \end{cases} \qquad (2)$$

sistemaga ega bo‘lamiz. Bu yerda $a_{ij}^{(1)} = a_{ij} - \dfrac{a_{i1} a_{1j}^{(1)}}{a_{11}}$, $b_j^{(1)} = b_j - \dfrac{b_1 a_{j1}}{a_{11}}$ i=2,…,n; j=2,3,…,n.

(2) sistema uchun yuqoridagi hisoblashlar (noma’lumlarni ketma-ket yuqotish) ni bir necha bor takrorlab, quyidagi

$$\begin{cases} x_1 + a_{12}^{(1)} x_2 + a_{13}^{(1)} x_3 + ... + a_{1n}^{(1)} x_n = b_1^{(1)} \\ x_2 + a_{23}^{(2)} x_3 + ... + a_{2n}^{(2)} x_n = b_2^{(2)} \\ ..... \\ x_n = b_n^{(n)} \end{cases} \qquad (3)$$

sistemani hosil qilamiz va x_i larni topish uchun

$$x_k = a_{k,n-1}^{(k-1)} - \sum_{j:=k+1}^{n} a_{kj}^{(k-1)} x_j , k = n, n-1, n-2, ..., 1$$

formulaga ega bo‘lamiz.

Misol 2. Quyidagi

$$\begin{cases} x_1 + 2x_2 - x_3 = -1 \\ 2x_1 - 3x_2 + 4x_3 = 13 \\ -3x_1 + x_2 - 2x_3 = -6 \end{cases}$$

tenglamalar sitemasini Gauss usulida yeching.

Yechish.

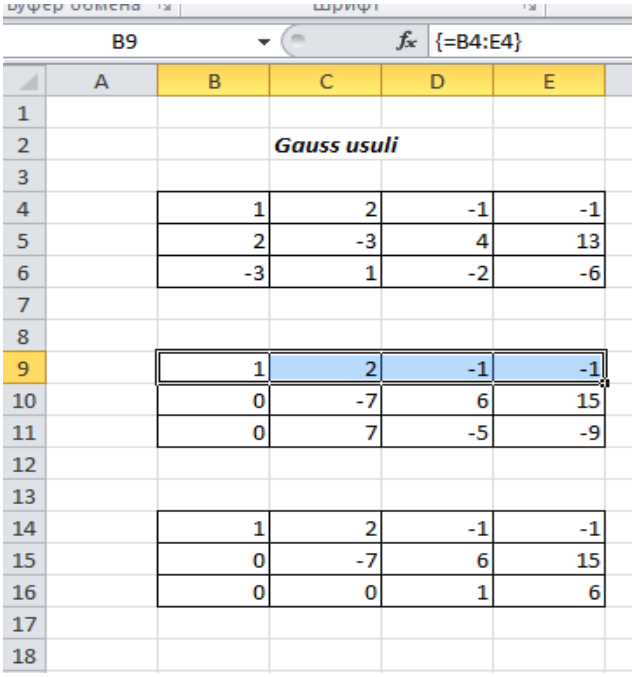
$$\begin{cases} x_1 + 2x_2 - x_3 = -1 \\ 2x_1 - 3x_2 + 4x_3 = 13 \\ -3x_1 + x_2 - 2x_3 = -6 \end{cases} \Leftrightarrow \begin{cases} x_1 + 2x_2 - x_3 = -1 \\ 7x_2 - 6x_3 = -15 \\ 7x_2 - 5x_3 = -9 \end{cases} \Leftrightarrow \begin{cases} x_1 + 2x_2 - x_3 = -1 \\ 7x_2 - 6x_3 = -15 \\ -x_3 = -6 \end{cases} \Leftrightarrow$$

$$\begin{cases} x_1 + 2x_2 - x_3 = -1 \\ 7x_2 - 6x_3 = -15 \\ x_3 = 6 \end{cases} \Leftrightarrow \begin{cases} x_1 + 2x_2 - 6 = -1 \\ 7x_2 - 36 = -15 \\ x_3 = 6 \end{cases} \Leftrightarrow \begin{cases} x_1 + 2x_2 - 6 = -1 \\ 7x_2 = 21 \\ x_3 = 6 \end{cases} \Leftrightarrow$$

$$\begin{cases} x_1 + 6 - 6 = -1 \\ x_2 = 3 \\ x_3 = 6 \end{cases} \Leftrightarrow \begin{cases} x_1 = -1 \\ x_2 = 3 \\ x_3 = 6 \end{cases}$$

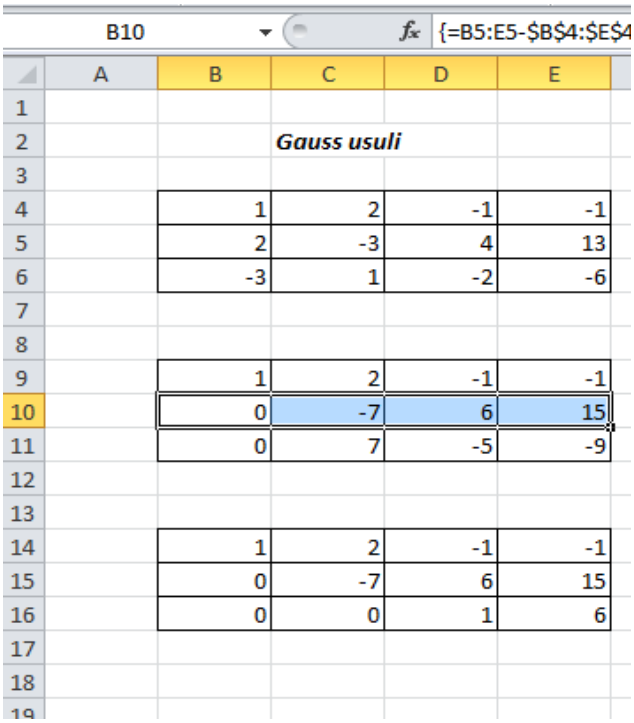
Javob: $x_1 = -1,\ x_2 = 3,\ x_3 = 6.$

Chiziqli algebraik tenglamalar sistemasini Gauss usulida yechish uchun elektron jadvalga kiritib ishliymiz.

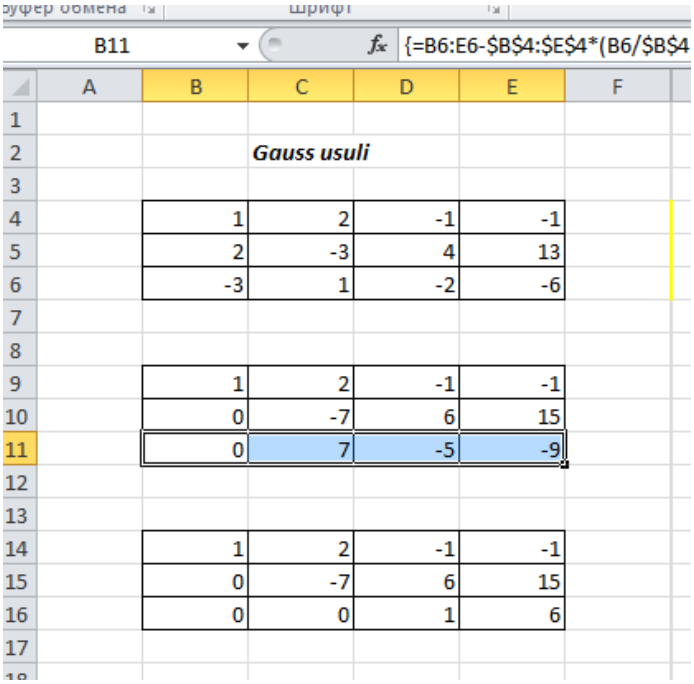


	A	B	C	D	E
1					
2			*Gauss usuli*		
3					
4		1	2	-1	-1
5		2	-3	4	13
6		-3	1	-2	-6
7					
8					
9		1	2	-1	-1
10		0	-7	6	15
11		0	7	-5	-9
12					
13					
14		1	2	-1	-1
15		0	-7	6	15
16		0	0	1	6
17					
18					

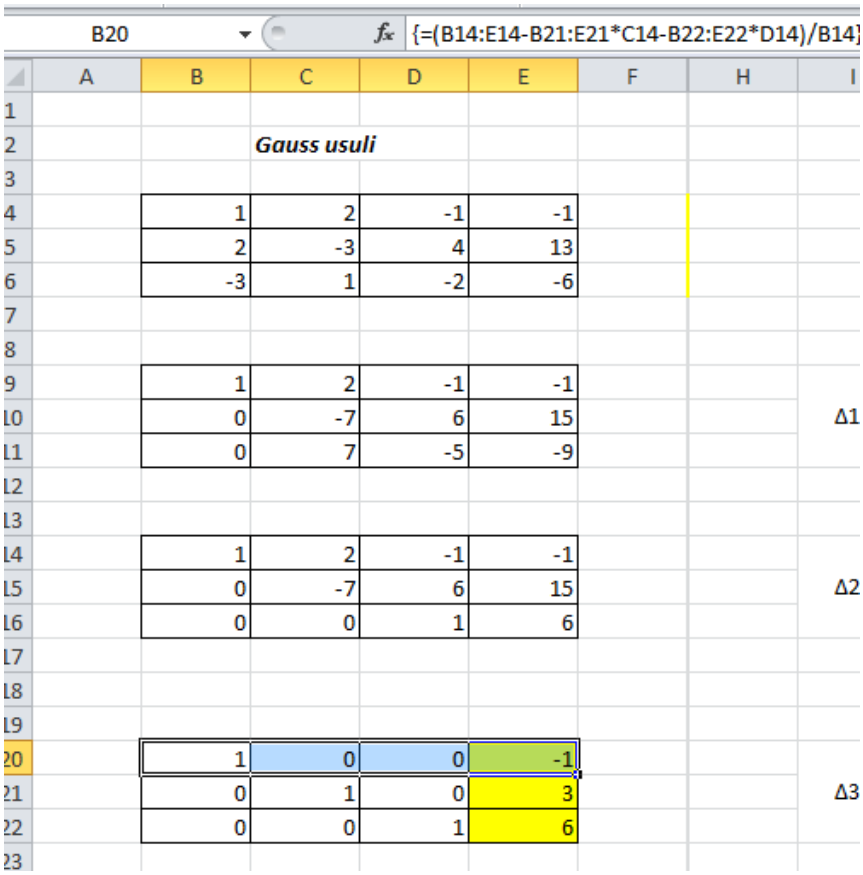
Rasm1.1.



Rasm1.2.



Rasm1.3.



Rasm1.4.

Teskari matritsa usuli. Bizga n-o‘lchovli

$$A=\begin{Vmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \dots & \dots & \dots & \dots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{Vmatrix}$$

kvadrat matritsa berilgan bo‘lsin.

Tarif. A matritsaga teskari matritsa deb shunday A^{-1} matritsaga aytiladiki,

$$A^{-1}\cdot A=E$$

bo‘ladi. Bu yerda E birlik matritsa, ya’ni

$$E=\begin{Vmatrix} 1 & 0 & \dots & 0 \\ 0 & 1 & \dots & 0 \\ \dots & \dots & \dots & \dots \\ 0 & 0 & \dots & 1 \end{Vmatrix}$$

Teorema. Agar A matritsa elementlaridan tuzilgan determenant qiymati noldan farqli, ya’ni $det\,A\neq 0$ bo‘lsa, A matritsaga teskari matritsa mavjud.

Agar A matritsaga teskari matritsa mavjud bo‘lsa, u quyidagi formula yordamida hisoblanadi

$$A^{-1} = \begin{Vmatrix} \frac{A_{11}}{\Delta} & \frac{A_{21}}{\Delta} & \dots & \frac{A_{n1}}{\Delta} \\ \frac{A_{12}}{\Delta} & \frac{A_{22}}{\Delta} & \dots & \frac{A_{n2}}{\Delta} \\ \dots & \dots & \dots & \dots \\ \frac{A_{1n}}{\Delta} & \frac{A_{2n}}{\Delta} & \dots & \frac{A_{nn}}{\Delta} \end{Vmatrix}$$

bu yerda $\Delta = det\, A$, A_{ij} - a_{ij} elementlarning algebraik to‘ldiruvchilari $(i,j = 1,n)$:

$$A_{ij} = (-1)^{i+j} \begin{vmatrix} a_{11} & a_{12} & \dots & a_{1,j-1} & a_{1,j+1} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2,j-1} & a_{2,j+1} & \dots & a_{2n} \\ \dots & \dots & \dots & \dots & \dots & \dots & \dots \\ a_{i-1,1} & a_{i-1,2} & \dots & a_{i-1,j-1} & a_{i-1,j+1} & \dots & a_{i-1,n} \\ a_{i+1,1} & a_{i+1,2} & \dots & a_{i+1,j-1} & a_{i+1,j+1} & \dots & a_{i+1,n} \\ \dots & \dots & \dots & \dots & \dots & \dots & \dots \\ a_{n1} & a_{n2} & \dots & a_{n,j-1} & a_{n,j+1} & \dots & a_{n,n} \end{vmatrix}, \quad i, j = 1,2,3,\dots,n.$$

Misol 3. $A = \begin{Vmatrix} 5 & 1 & 3 \\ 0 & 4 & 2 \\ -2 & 1 & 0 \end{Vmatrix}$ matritsaga teskari matritsa toping.

Yechish.

$$\Delta = det\, A = \begin{vmatrix} 5 & 1 & 3 \\ 0 & 4 & 2 \\ -2 & 1 & 0 \end{vmatrix} = -4 + 24 - 10 = 10;$$

Algebraik to‘ldiruvchilarni hisoblaymiz: $A_{11} = -2;$ $A_{12} = -4;$ $A_{13} = 8;$ $A_{21} = 3;$ $A_{22} = 6;$ $A_{23} = -7;$ $A_{31} = 10;$ $A_{32} = -10;$ $A_{33} = 20.$

U holda

$$A^{-1} = \begin{Vmatrix} -\frac{1}{5} & \frac{3}{10} & 1 \\ -\frac{2}{5} & \frac{3}{5} & -1 \\ \frac{4}{5} & -\frac{7}{10} & 2 \end{Vmatrix}$$

Chiziqli algebraik tenglamalar sistemasini teskari matritsa usulida yechish uchun, (1) ni

$$AX = B \qquad (4)$$

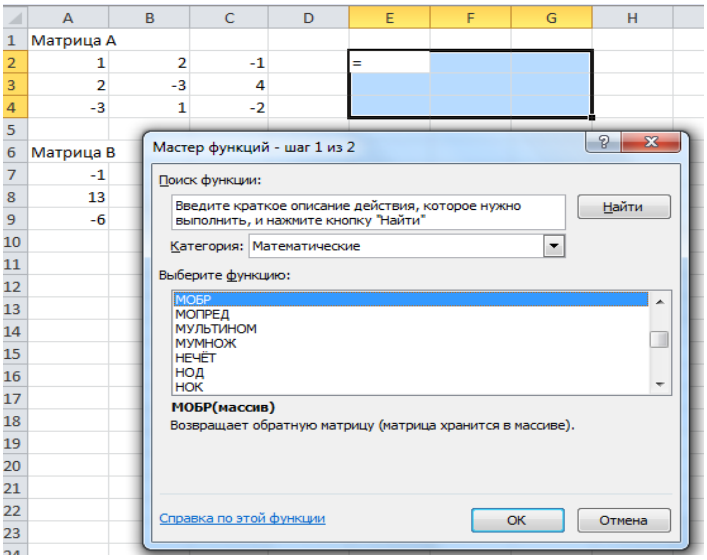
ko‘rinishda yozib olamiz. Bu yerda

$$A = \begin{Vmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \dots & \dots & \dots & \dots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{Vmatrix}; \quad X = \begin{Vmatrix} x_1 \\ x_2 \\ \dots \\ x_n \end{Vmatrix}; \quad B = \begin{Vmatrix} b_1 \\ b_2 \\ \dots \\ b_n \end{Vmatrix}.$$

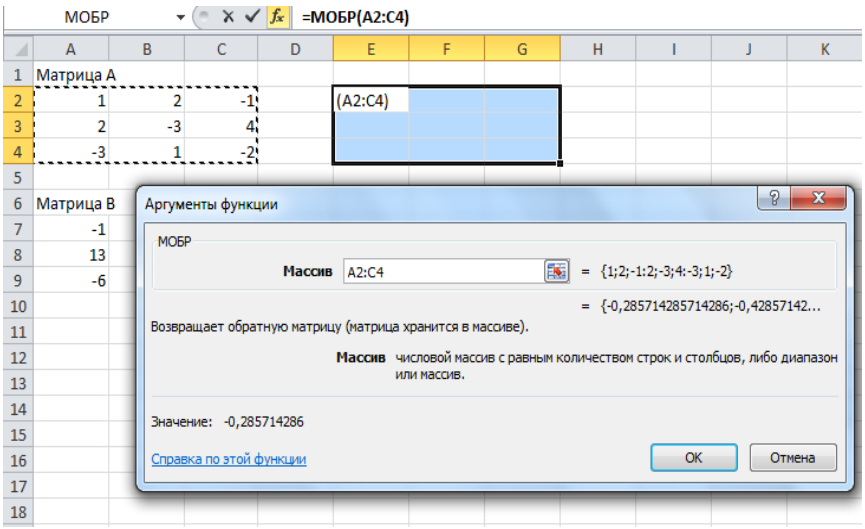
(4) ni A^{-1} ga ko‘paytirib, (1) sistemaning yechimini matritsa ko‘rinishida hosil qilamiz

CHATSni teskari $X = A^{-1}B$ matritsa usulida yechishga elektron jadvalni ko‘llash. Quyidagi

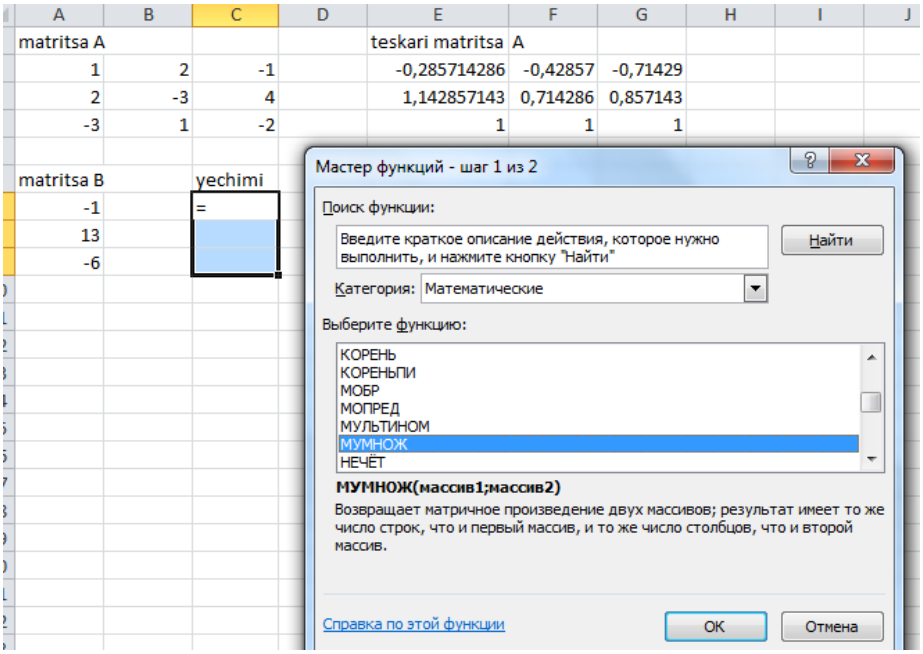
$$\begin{cases} x_1 + 2x_2 - x_3 = -1 \\ 2x_1 - 3x_2 + 4x_3 = 13 \\ -3x_1 + x_2 - 2x_3 = -6 \end{cases}$$ teskari matritsa usulida elektron jadvalda yeching



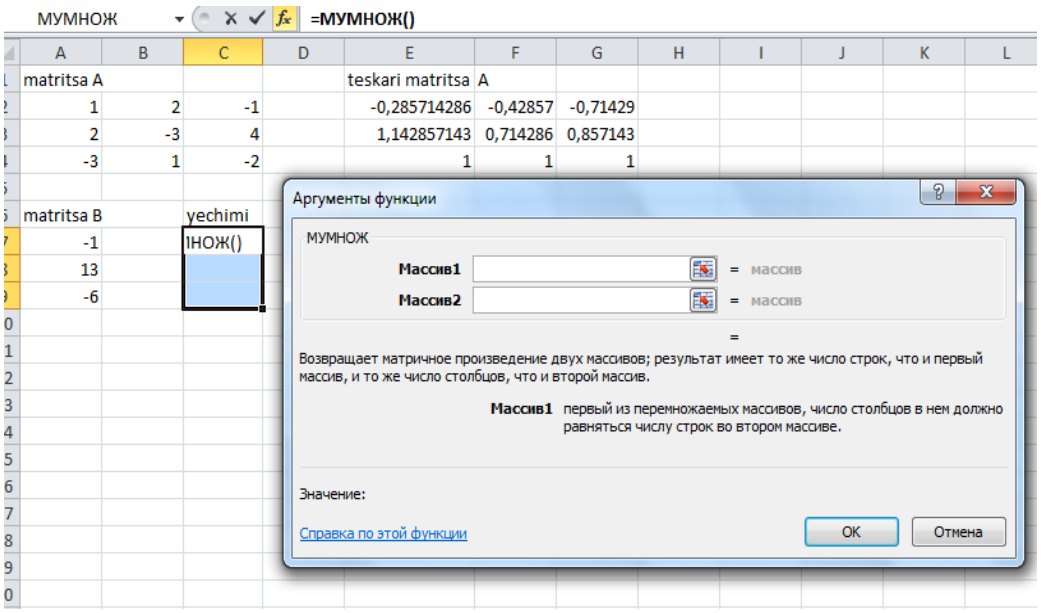
Rasm1.5.



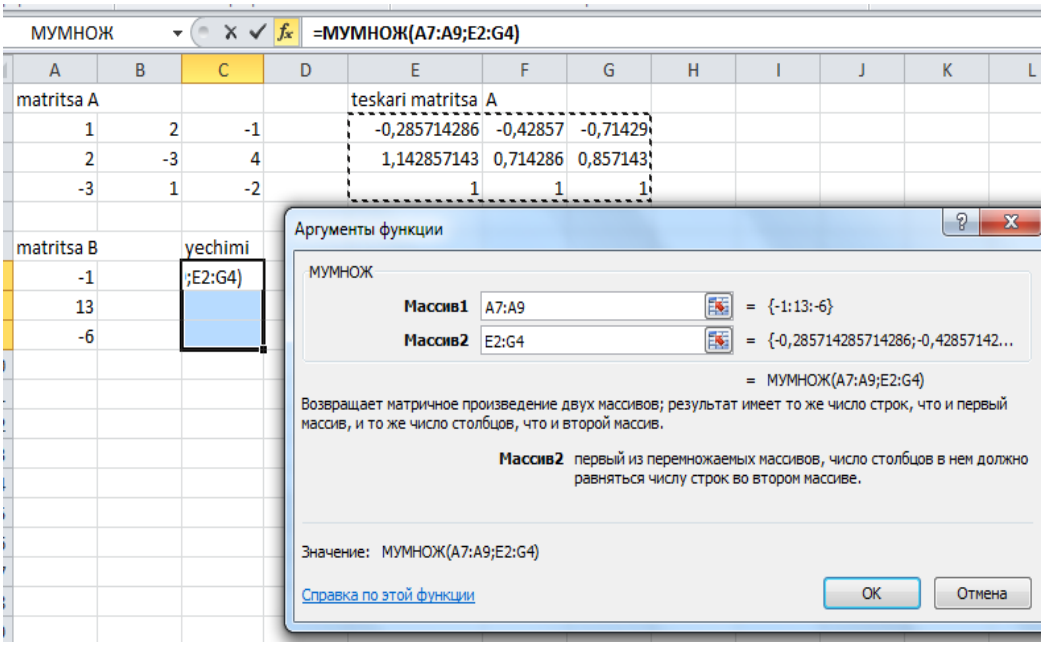
Rasm1.6.



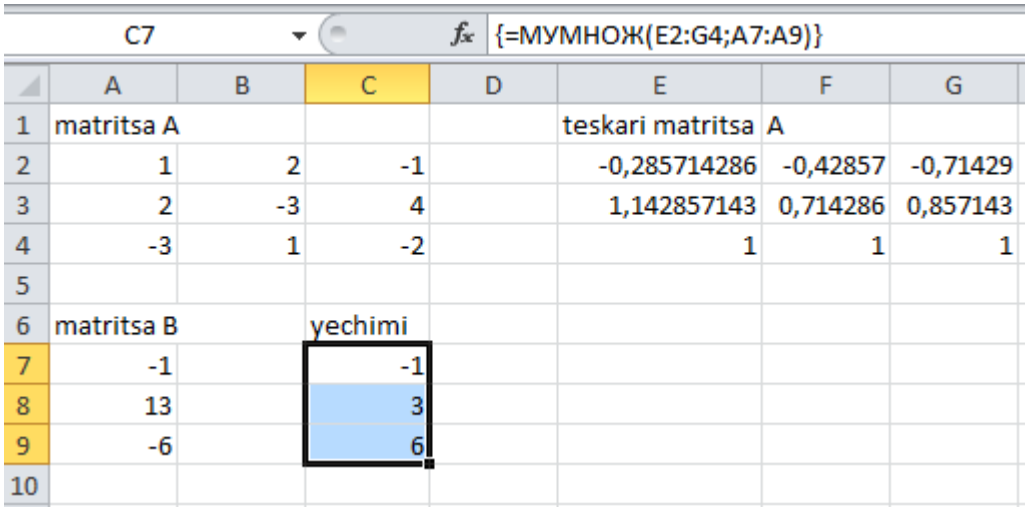
Rasm1.7.



Rasm1.8.



Rasm1.9.



	A	B	C	D	E	F	G
1	matritsa A				teskari matritsa	A	
2	1	2	-1		-0,285714286	-0,42857	-0,71429
3	2	-3	4		1,142857143	0,714286	0,857143
4	-3	1	-2		1	1	1
5							
6	matritsa B		yechimi				
7	-1		-1				
8	13		3				
9	-6		6				
10							

Rasm1.10.

Iteratsiya usuli. Noma'lumlar soni ko'p bo'lganda Kramer, Gauss, teskari matritsa usullarining aniq yechimlar beruvchi chiziqli sistema sxemasi juda murakkab bo'lib qoladi. Bunday hollarda sistema ildizlarini topish uchun ba'zan taqribiy sonli usullardan foydalanish qulaydir. Shunday usullardan biri iteratsiya usulidir. Quyidagi tenglamalar sistemasi berilgan bo'lsin:

$$\sum_{j=1}^{n} a_{ij} x_j = b_i, \ i = 1,2,...,n \qquad (5)$$

Bu sistema matritsa ko'rinishda quyidagicha yoziladi:

$$Ax = b,$$

bu yerda

$$A = \begin{pmatrix} a_{11} & a_{12} & .. & a_{1n} \\ a_{21} & a_{22} & ... & a_{2n} \\ ... & ... & ... & ... \\ a_{n1} & a_{n2} & ... & a_{nn} \end{pmatrix}, \ B = \begin{pmatrix} b_1 \\ b_2 \\ ... \\ b_n \end{pmatrix}, \ x = \begin{pmatrix} x_1 \\ x_2 \\ ... \\ x_n \end{pmatrix}.$$

Biz (5) da $a_{ii} \neq 0$ (i=1,n) deb faraz qilamiz.

Tenglamalar sistemasida 1- tenglamani x_1 ga nisbatan, 2- tenglamani x_2 ga nisbatan va oxirgisini x_n ga nisbatan yechamiz:

$$\begin{cases} x_1 = \beta_1 + 0 + \alpha_{12} x_2 + \alpha_{13} x_3 + ... + \alpha_{1n} x_n \\ x_2 = \beta_2 + \alpha_{21} x_2 + 0 + \alpha_{23} x_3 + ... + \alpha_{2n} x_n \\ ..... \\ x_n = \beta_n + \alpha_{n1} x_2 + \alpha_{n2} x_2 + \alpha_{n3} x_3 + ... + \alpha_{nn-1} x_{n-1} + 0 \end{cases} \qquad (6)$$

Ushbu

$$\alpha = \begin{pmatrix} 0 & \alpha_{12} & \dots & \alpha_{in} \\ \alpha_{21} & 0 & \dots & \alpha_{2n} \\ \dots & \dots & \dots & \dots \\ \alpha_{n1} & a_{n2} & \dots & 0 \end{pmatrix} \text{ va } \beta = \begin{pmatrix} \beta_1 \\ \beta_2 \\ \dots \\ \beta_n \end{pmatrix}$$

matritsalar yordamida (6) ni quyidagicha yozishimiz mumkin

$$x = \beta + \alpha x \tag{7}$$

(7) sistemani ketma-ket yaqinlashishlar usuli bilan yechamiz:

$$x^{(0)}=\beta, \quad x^{(1)} = \beta + \alpha x^{(0)}, \; x^{(2)} = \beta + \alpha x^{(1)}, \dots.$$

Bu jarayonni quyidagicha ifodalaymiz:

$$x^{(k)} = \beta + \alpha x^{(k-1)}, \; x^{(0)}=\beta \tag{8}$$

Bu ketma-ketlikning limiti, agar u mavjud bo‘lsa (5) sistemaning izlanayotgan yechimi bo‘ladi.

Biz

$$x^{(k)} = \begin{pmatrix} x_1^{(k)} \\ x_2^{(k)} \\ \dots \\ x_n^{(k)} \end{pmatrix}$$

belgilashni kiritamiz.

Agar ixtiyoriy ε>0 uchun $\left|x_i^{(k+1)} - x_i^{(k)}\right| < \varepsilon$ tengsizlik barcha i =1,2,...n uchun bajarilsa $x^{(k+1)} = \left(x_1^{(k+1)}, x_2^{(k+1)}, \dots, x_n^{(k+1)}\right)$ vektor (5) sistemaning ε aniqlikdagi yechimi deb yuritiladi.

Teorema. Agar keltirilgan (6) sistema uchun $\sum_{j=1}^{n}\left|\alpha_{ij}\right| < 1$ yoki $\sum_{i=1}^{n}\left|\alpha_{ij}\right| < 1$ shartlardan birontasi bajarilsa, u holda (8) iteratsiya jarayoni boshlang‘ich yaqinlashishni tanlashga bog‘liq bo‘lmagan holda yagona yechimga yaqinlashadi.

Natija (8) tenglamalar sistemasi uchun $\sum_{\substack{j\neq 1 \\ j=1}}^{n} |a_{ij}| < |a_{11}|$, $\sum_{\substack{j\neq 2 \\ j=1}}^{n} |a_{2j}| < |a_{22}|$, ..., $\sum_{\substack{j\neq n \\ j=1}}^{n} |a_{nj}| < |a_{nn}|$ tengsizliklar bajarilsa (8) iteratsiya yaqinlashuvchi bo‘ladi.

Misol 4. Tenglamalar sistemasini ε=0,001 aniqlikda oddiy iteratsiya usuli bilan yeching:

$$\begin{cases} 4x_1 + 0{,}24x_2 - 0{,}08x_3 = 8 \\ 0{,}09x_1 + 3x_2 - 0{,}15x_3 = 9 \\ 0{,}04x_1 - 0{,}08x_2 + 4x_3 = 20 \end{cases}$$

Yechish:

$$\left.\begin{array}{l} 0{,}24 + |-0{,}08| = 0{,}32 < |a_{11}| = 4 \\ 0{,}09 + |-0{,}15| = 0{,}24 < |a_{22}| = 3 \\ 0{,}04 + |0{,}08| = 0{,}12 < |a_{33}| = 4 \end{array}\right\}$$

Demak, iteratsiya yaqinlashadi

$$\begin{cases} x_1 = 2 - 0{,}06x_2 + 0{,}02x_3 \\ x_2 = 3 - 0{,}03x_1 + 0{,}05x_3 \\ x_3 = 5 - 0{,}01x_1 + 0{,}02x_2 \end{cases}.$$

Nolinchi yaqinlashish: $x^{(0)} = \beta = \begin{pmatrix} 2 \\ 3 \\ 5 \end{pmatrix}$, $x_1^{(0)} = 2, x_2^{(0)} = 3, x_3^{(0)} = 5.$

$$\alpha = \begin{pmatrix} 0 & -0{,}06 & 0{,}02 \\ -0{,}03 & 0 & 0{,}05 \\ -0{,}01 & 0{,}02 & 0 \end{pmatrix}$$

(8) formula yordamida hisoblashlarni bajaramiz.

$$x^{(1)} = \beta + \alpha x^{(0)} = \begin{pmatrix} 1{,}92 \\ 3{,}19 \\ 5{,}04 \end{pmatrix}; \; x_1^{(1)} = 1{,}92; x_2^{(1)} = 3{,}19; x_3^{(0)} = 5{,}04.$$

$$x^{(2)} = \beta + \alpha x^{(1)} = \begin{pmatrix} 1{,}9094 \\ 3{,}1944 \\ 5{,}0446 \end{pmatrix}; \quad x^{(3)} = \beta + \alpha x^{(2)} = \begin{pmatrix} 1{,}90923 \\ 3{,}19495 \\ 5{,}04485 \end{pmatrix};$$

$$x_1^{(2)} = 1{,}9094; x_2^{(2)} = 3{,}1944; x_3^{(2)} = 5{,}0446.$$

Ushbu jadval hosil bo‘ladi.

Yaqinla-shishlar (k)	x_1	x_2	x_3	$x_1^{(k)} - x_1^{(k-1)}$	$x_2^{(k)} - x_2^{(k-1)}$	$x_3^{(k)} - x_3^{(k-1)}$
0	2	3	5	-	-	-

1	1,92	3,19	5,04	0,08	0,19	0,04
2	1,9094	3,1944	5,0446	0,0106	0,0044	0,0046
3	1,90923	3,19495	5,04485	0,00017	0,00055	0,00025

Bunda $\left|x_1^{(3)} - x_1^{(2)}\right| = 0{,}00017 < \varepsilon$, $\left|x_2^{(3)} - x_2^{(2)}\right| = 0{,}00055 < \varepsilon$, $\left|x_3^{(3)} - x_3^{(2)}\right| = 0{,}00025 < \varepsilon$ bajariladi. $x=x^{(3)}$ CHTS ning taqribiy yechimi.

Tenglamalar sistemasini iteratsiya usulida yechish uchun elektron jadvalni ko‘llash.

2-AMALIYOT ISHI
ELEKTRON JADVALDA BERILGANLARNI STATISTIK USLUBIDA QAYTA ISHLASH.

Maqsad: Talabalarni ma'lumotlarni qayta ishlash tanlash yo‘li usullari bilan o‘zlashtirish. Ma'lumotlarning grafik ko‘rinishini tekshirish va asosiy raqamli xususiyatlarini kompyuter yordamida hisoblash ko‘nikmalariga ega bo‘lish.

Nazariy qism

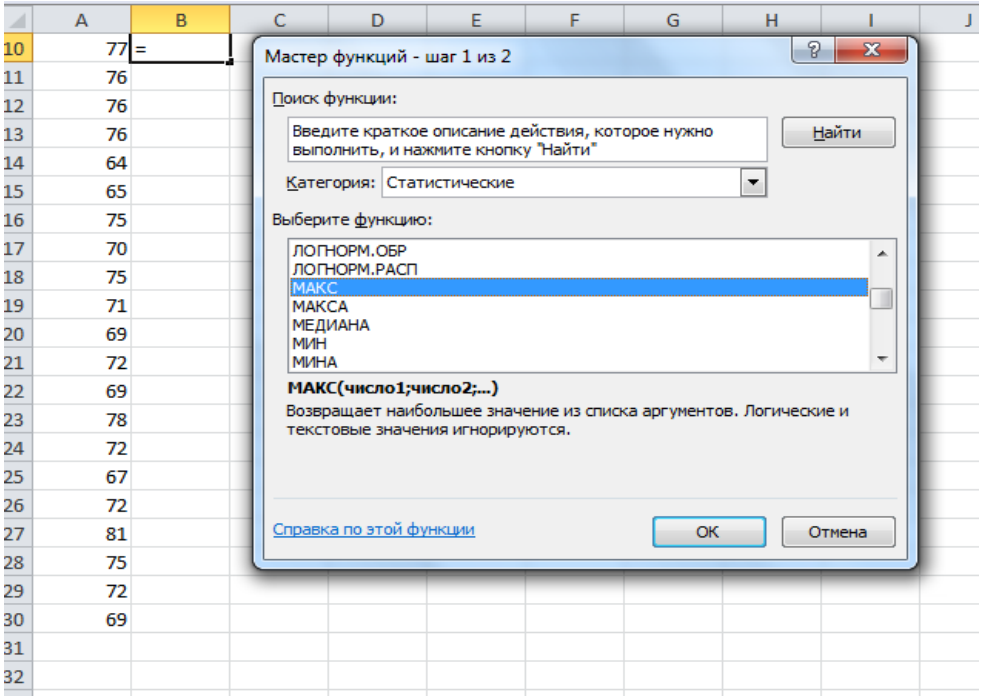
Ekonometriyadagi asosiy ob'ekt namunadir. N hajmining namunasi n-ilovasida olingan x1.x2 ... .xn - doimiy shartlar ostida eksperimentning qisqacha takrorlanishi. Amalda, namuna ko‘pincha statistik ketma-ketlikda namoyon bo‘ladi. Buning uchun, namunadagi yolg'on qiymatlari k intervalgacha bo‘linadigan butun son eksa (bu raqam ixtiyoriy 5 dan 10 gacha tanlanadi), odatda teng, zn ning o‘rta nuqtalari hisoblab chiqiladi va namunadagi elementlarning soni n1ning har bir intervaliga kiritiladi. Statistik ketma-ketlik juftlik ketma-ketligi (z1, n1). Muammoni echimini va EXCEL 2010 da ko‘rib chiqamiz.

Misol 1. Do‘konning 30 kunlik daromad raqamlari namunasi berilgan:

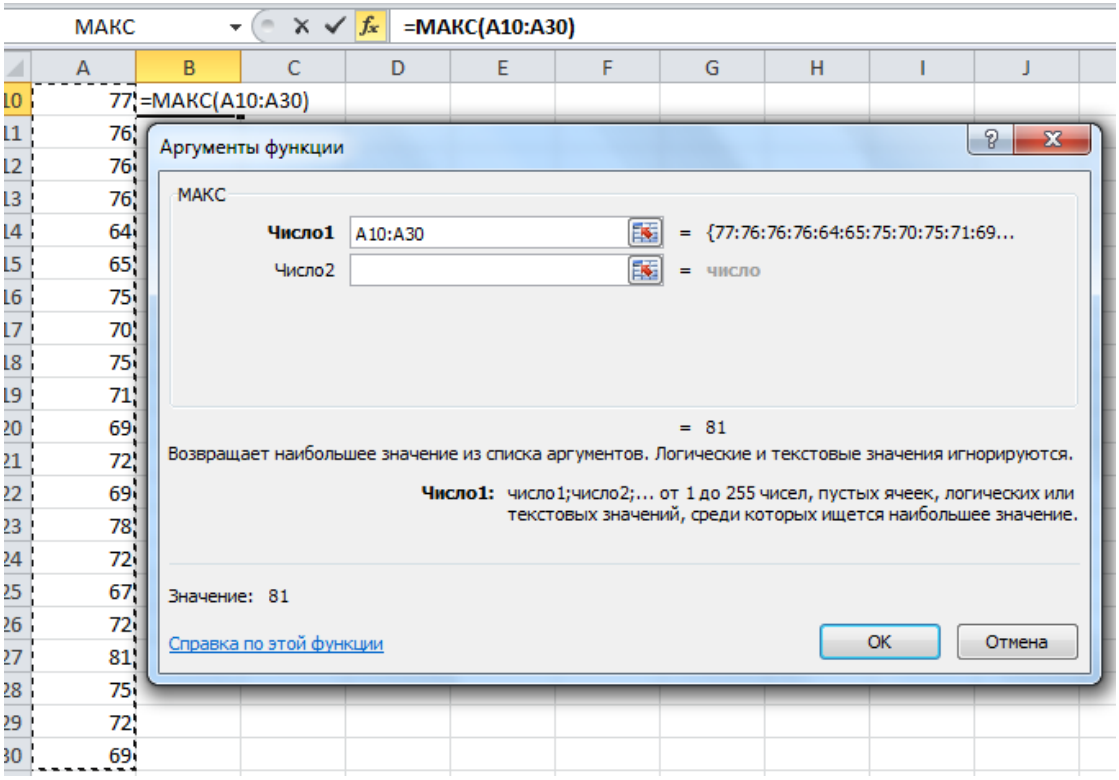
72	74	69	71	73	68	73	77	76	77	76	76	76	64	65
75	70	75	71	69	72	69	78	72	67	72	81	75	72	69

Statistik qator, ko‘pburchak, histogram va birikma egri hosil qilamiz. EXCEL dasturining kitobini oching.

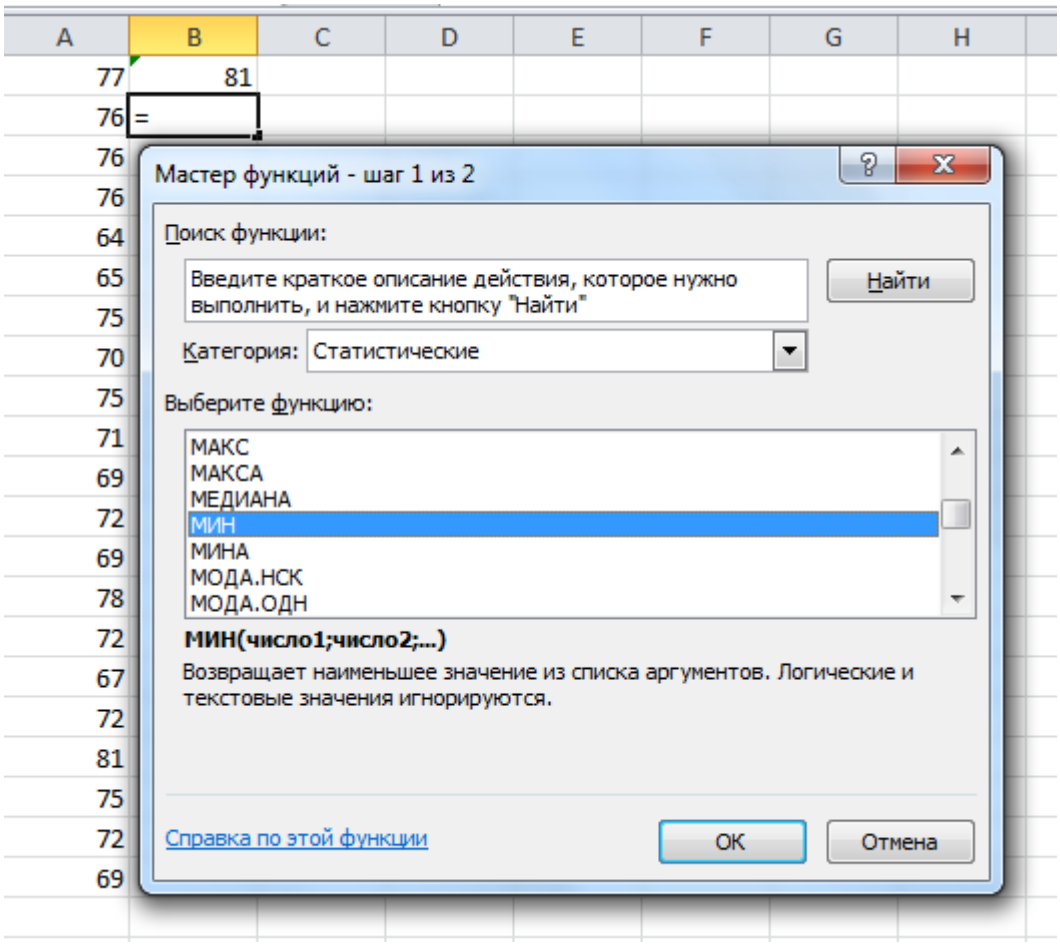
Birinchi ustunga (A1-A30 hujayralari) dastlabki ma'lumotlarni kiritishimiz kerak. Ma'lumotlar joylashgan raqamlar oralig'ini aniqlang. Buning uchun namunaning maksimal va minimal elementlarini topamiz. Biz B1 "Maksimal" va B2 "Minimal" ga kiramiz va funktsiyalarini argumentlar ("son" ustuniga) belgilab lamiz. Natijada 64 va 81 bo‘ladi.



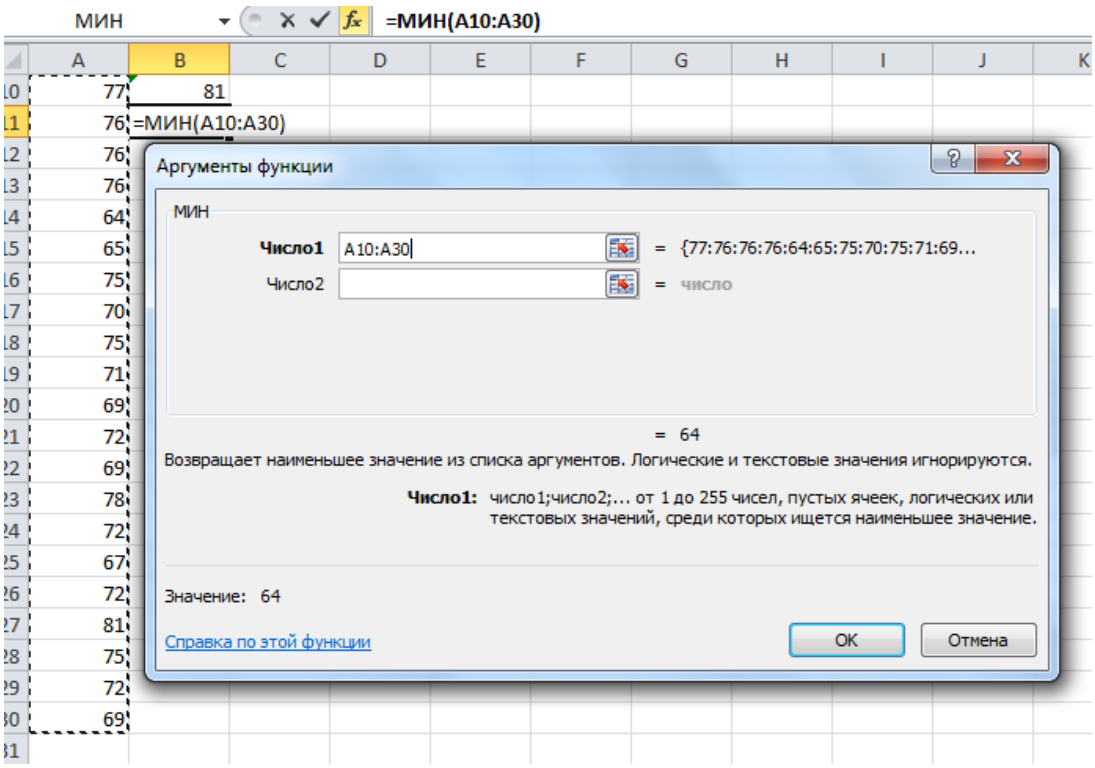
Rasm2.1.



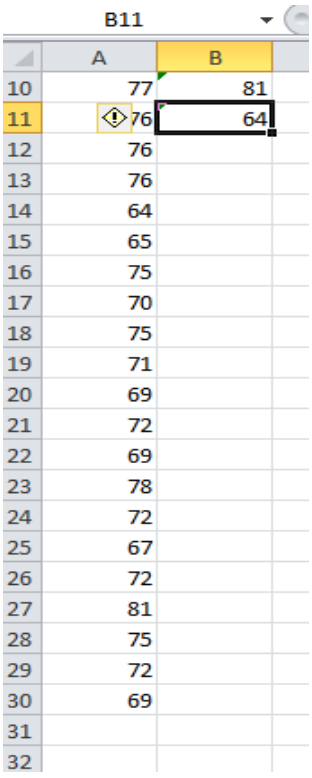
Rasm2.2.



Rasm2.3.



Rasm2.4.



	A	B
10	77	81
11	76	64
12	76	
13	76	
14	64	
15	65	
16	75	
17	70	
18	75	
19	71	
20	69	
21	72	
22	69	
23	78	
24	72	
25	67	
26	72	
27	81	
28	75	
29	72	
30	69	
31		
32		

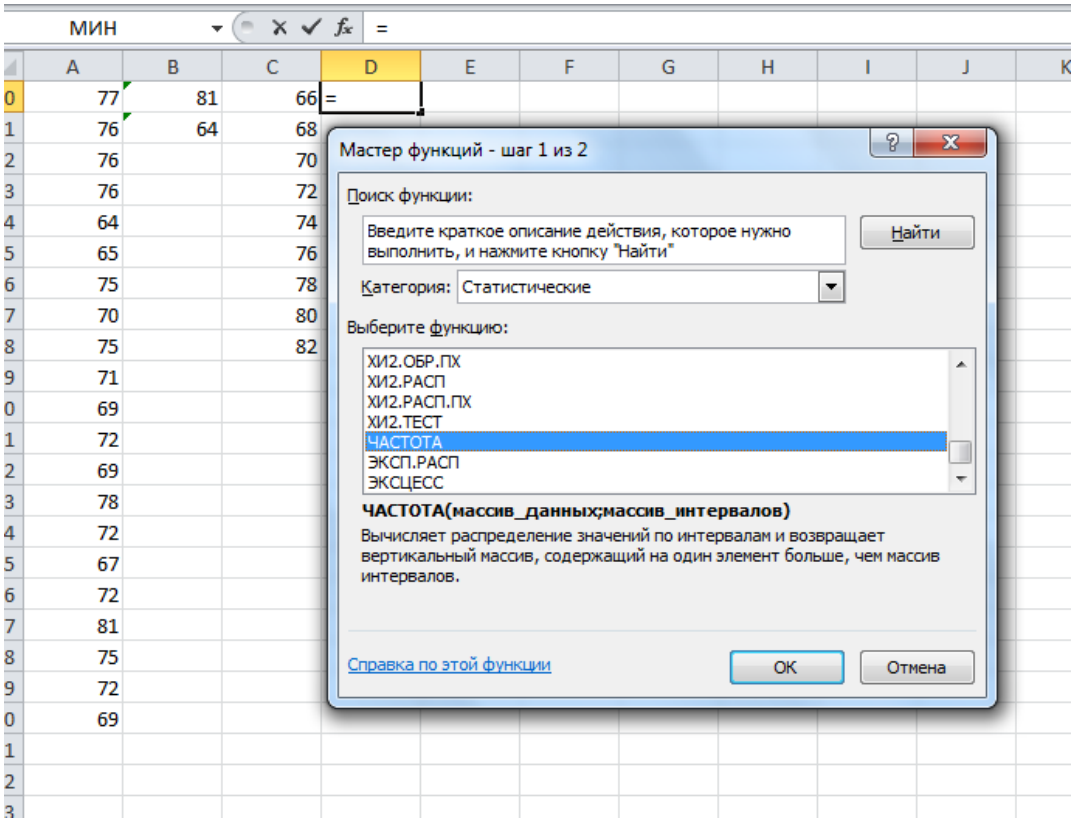
Rasm2.5.

Barcha ma'lumotlarning segmentga mos kelishini ko‘rish mumkin [64, 81]. Uni 9 (5 dan 10 gacha tasodifiy tanlangan) bilan ajratib oling:64-66; 66-68: 68-70: 70-72: 72-74, 74-76, 76-78, 78-80, 80-82. C1-C10 hujayralarida guruhlararo intervallarning yuqori chegaralariga - 66, 68, 70, 72, 74, 76, 78, 80, 82 raqamlariga kiring.

	A	B	C
0	77	81	66
1	76	64	68
2	76		70
3	76		72
4	64		74
5	65		76
6	75		78
7	70		80
8	75		82
9	71		
0	69		
1	72		
2	69		
3	78		
4	72		
5	67		
6	72		
7	81		
8	75		
9	72		
0	69		

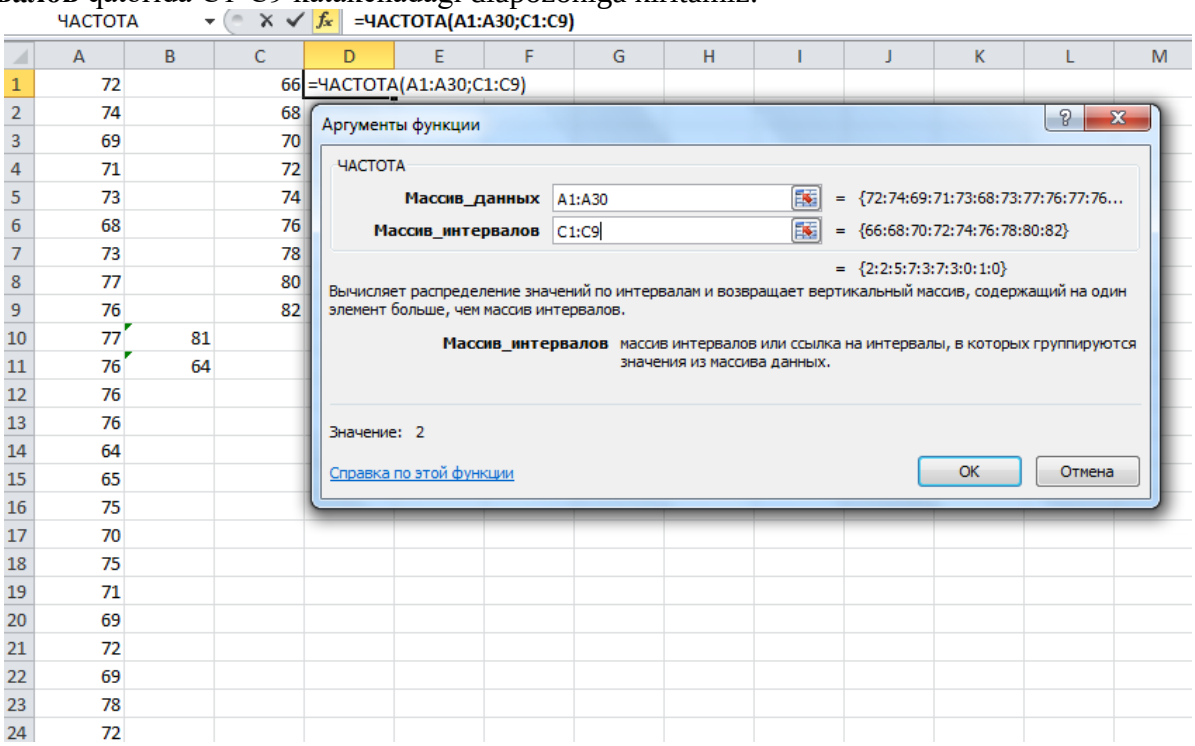
Rasm2.6.

D1ga n_1 chastotalarini hisoblash uchun **Статистические** kategoriyasida joylashgan **Частота** funktsiyani ishlating.

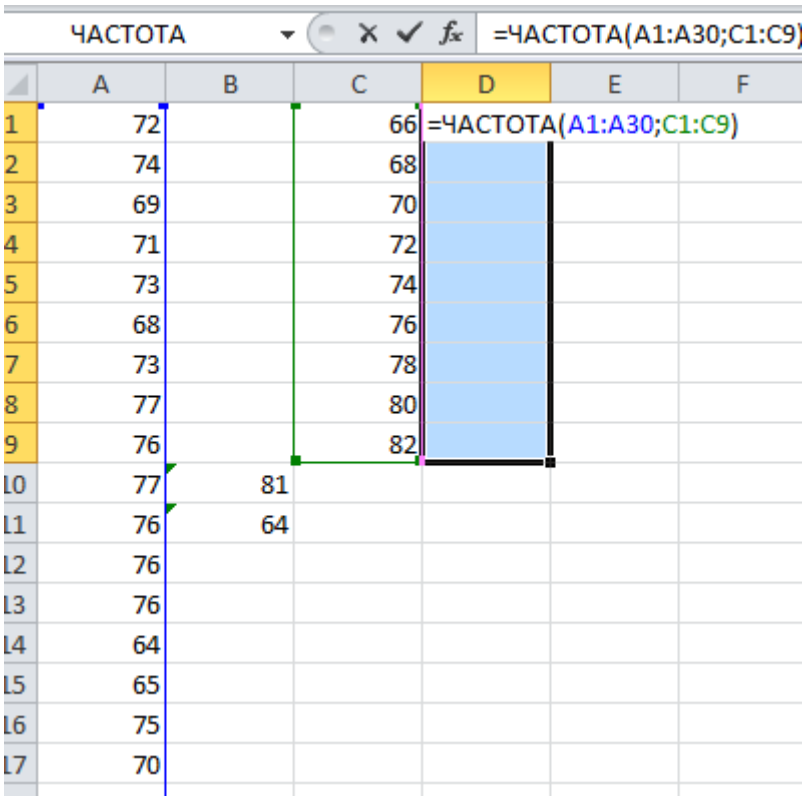


Rasm2.7.

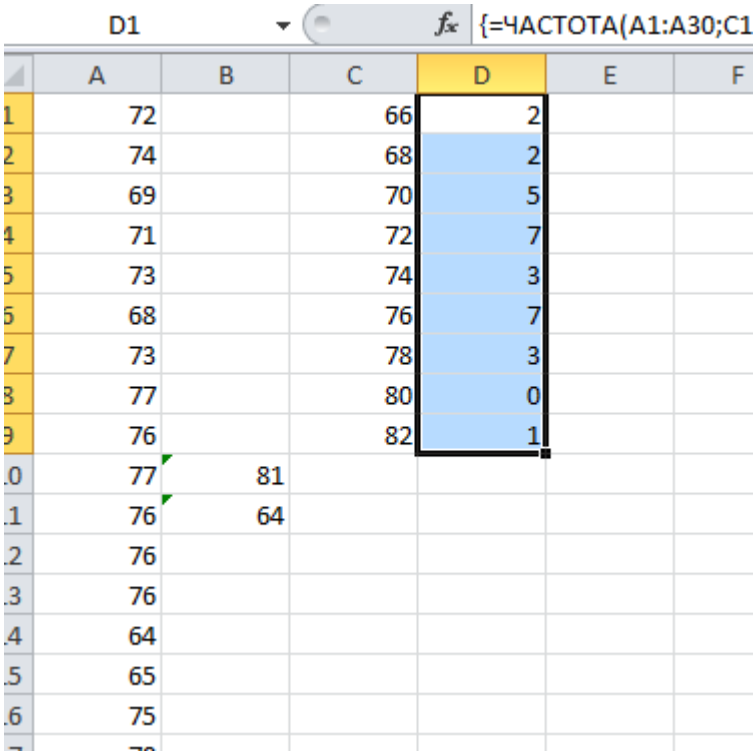
Массив данных qatorida A1-A30 katakchadagi diapozonni kiritamiz. **Массив_ интервалов** qatorida C1-C9 katakchadagi diapozoniga kiritamiz.



Rasm2.8.



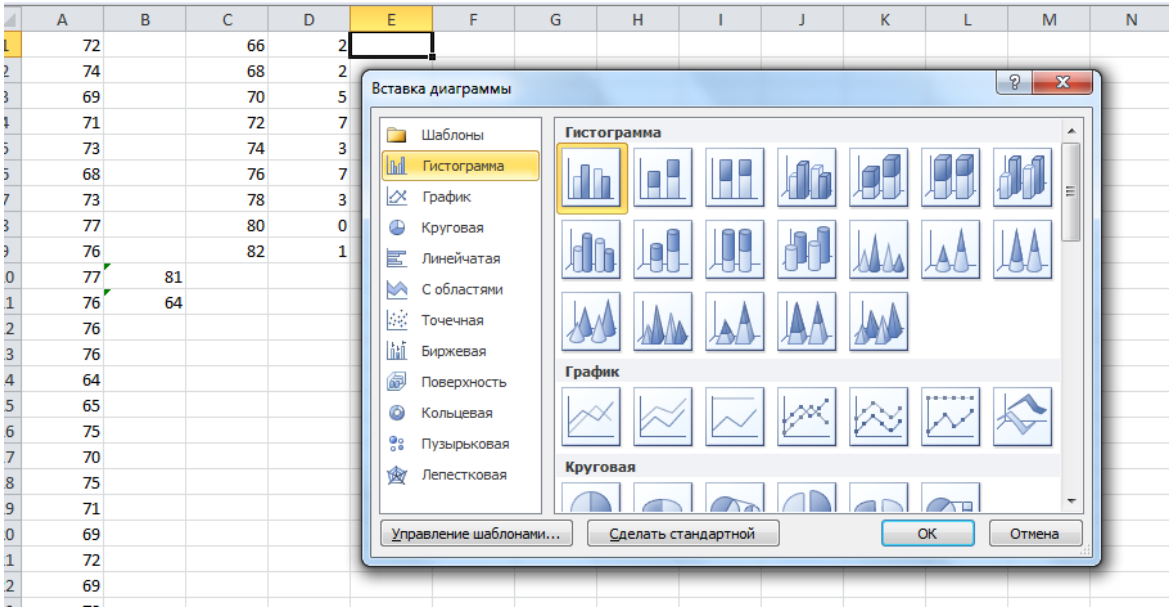
Rasm2.9.



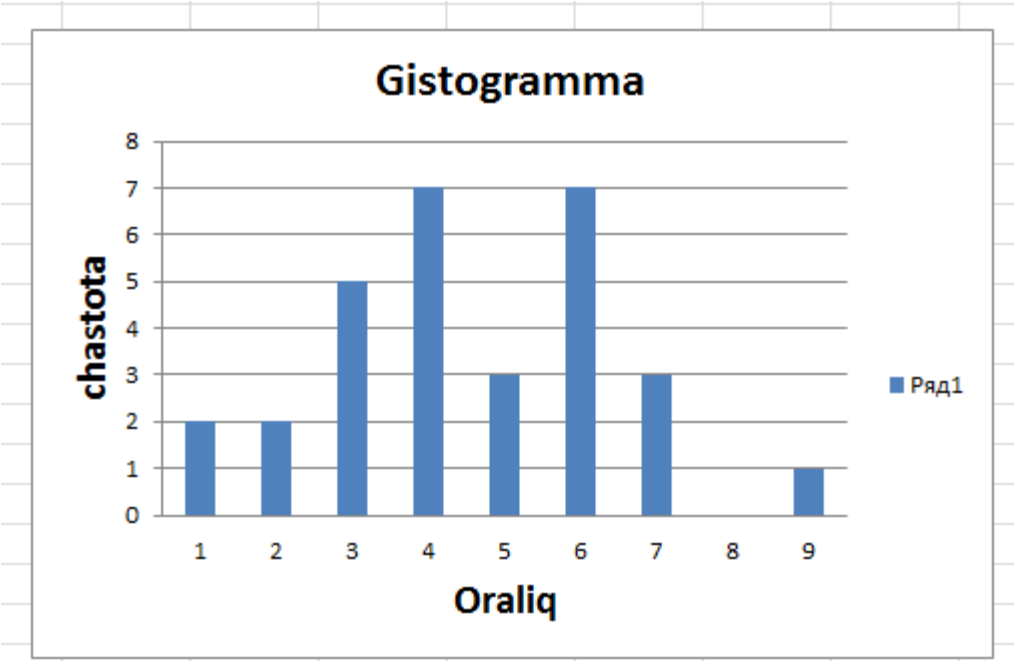
Rasm2.10.

Natijani esa D1-D9 belgilab olib avval F2 bosamiz, so‘ng **CTRL+SHIFT+ENTER**. Natijada – chastota oralig‘i 2,2,5,7,3,7,3,0,1.

Gistogrammani yaratish uchun tanlanish **Вставка/Диаграмма** kerak yoki asosiy paneldagi tegishli belgini bosing (kursor bo‘sh xonada bo‘lishi kerak), so‘ngra quyidagi turni tanlang:**Гистограмма**, namunadagi ko‘rinish, ni bosing **Далее**, yo‘nalish bo‘yicha **Подписи Оси x** ga **C1-C5** hujayra oralig'ini kiritish, **Далее** – **Гистограмма- Интервалы - Частота- Готово** bosing.

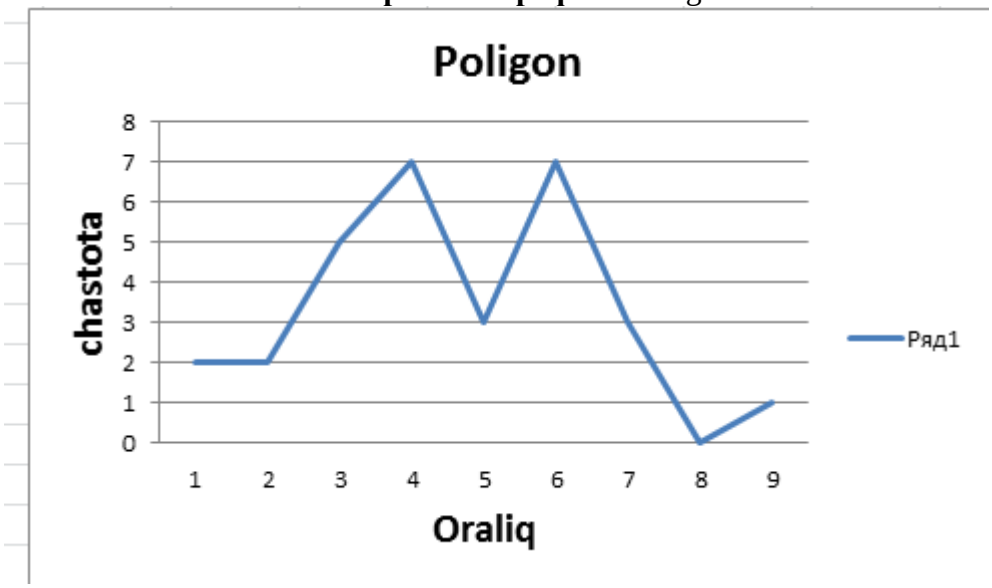


Rasm2.11.



Rasm2.12.

Ko‘pburchak yaratish uchun faqatgina grafik turini amalga oshiring **Гистограмма- График** bosing.

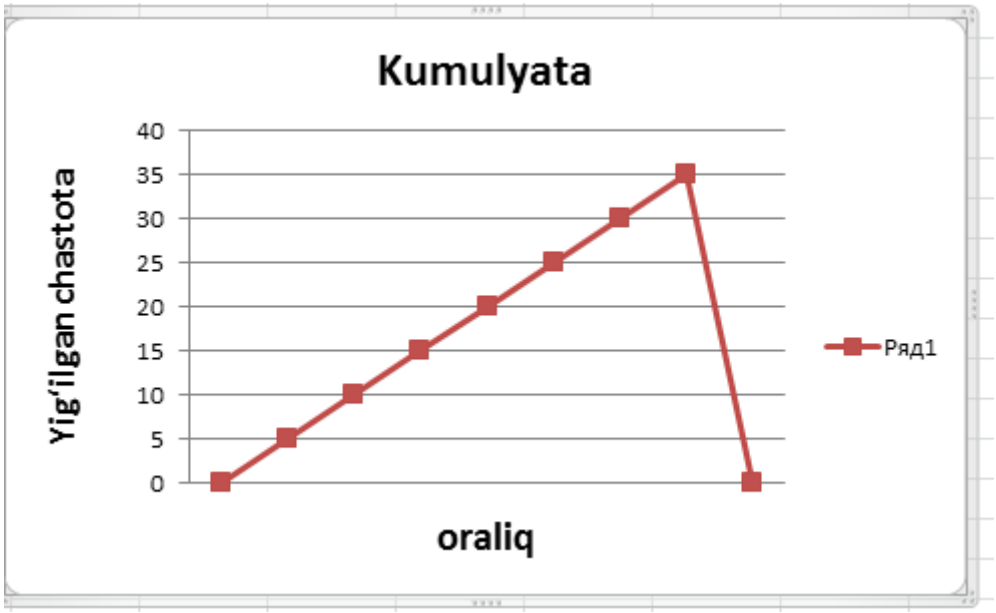


Rasm2.13.

Kumulyata egri qurish uchun to‘plangan chastotani hisoblashingiz kerak. Uning uchun E1 katakchaga «=D1», E2 ga «=D1+D2» kiritamiz va avtoto‘ldirish bilan E9 gacha siljitamiz.

Keyinchalik ko‘pburchak holatida bo‘lgani kabi, chiziqda ham grafik tuzamiz **Диапазон** da **E1- E9** kiritamiz, **Ряд- Подписи Оси x** ga **C1-C9** kiritamiz.

Namunaning asosiy raqam ko‘rsatkichlarini toping. Ularga kirish uchun biz ikkita ustunni tanlaymiz, masalan, F va G, biz birinchi navbatda xarakteristikaning nomini kiritamiz, ikkinchidan - funksiya, bu erda ma'lumotlar majmuasi **(Строка«Число1»),** A1-A30ulanishni belgilang.



Rasm2.14.

3-AMALIYOT ISHI
MATEMATIK MODELLASHTIRISHNING TRANSPORT MASALALARINI ELEKTRON JADVAL YORDAMIDA YECHISH.

Maqsad: Transport masalalarini matematik modellarini shakillantirib elektron jadval orqali yechimini topish va optimallashtirishni o‘rganish.

Nazariy qism

Transport muammolarini matematik shakllantirish

Umuman olganda, transport muammosining matematik shakllanishi quyidagicha ifodalanishi mumkin. Bir hil mahsulotga (masalan, ko‘mir, qum, tsement va boshqalar) ishlab chiqarish yoki saqlash nuqtalari va n iste'mol nuqtalari mavjud. Har bir mahsulot uchun, a**i**-ga mahsulotning ishlab chiqarish hajmi yoki mahsulot zahirasi (i (1,2, ..., m)) beriladi va har bir iste'mol nuqtasi uchun bj belgilanadi - j-th iste'mol nuqtasida mahsulotga bo‘lgan ehtiyoj (j { 1,2, ..., n}). i-ishlab chiqarish punktidan j-th iste'mol nuqtasiga qadar bir mahsulotni tashish yoki tashish narxi ma'lum.

Mahsulotning optimal transport rejasini aniqlash kerak, shuning uchun iste'molning barcha nuqtalarida talab qoniqtiriladi va barcha mahsulotlarning umumiy transport xarajatlari minimal.

Biz quyidagi o‘zgaruvchilarni hisobga olamiz: x_{ij} - i-ishlab chiqarish punktidan j-th iste'mol nuqtasiga ko‘chirilgan mahsulotning miqdori yoki transport hajmi. Keyinchalik, umuman, transport muammosining matematik formulasi quyidagi tarzda shakllantirilishi mumkin.

$$\sum_{i=1}^{m}\sum_{j=1}^{n} c_{ij}x_{ij} \to \min_{x\in\Delta_\beta}, \quad (\mathbf{3}.1)$$

Quyidagi tengsizlikka cheklovlar tizimida Δ_β mavjud bo‘lgan muqobil variantlar to‘plami mavjud:

$$\begin{cases} \sum_{j=1}^{n} x_{ij} = a_i, \forall i \in \{1,2,..., m\} (2.2) \\ \sum_{i=1}^{m} x_{ij} = b_j, \forall j \in \{1,2,..., n\} (2.3) \\ \sum_{i=1}^{m} a_i = \sum_{j=1}^{n} b_j, (2.4) \\ x_{ij} \geq 0, \forall i \in \{1,2,..., m\}, \forall j \in \{1,2,..., n\} (2.5) \end{cases}$$

Shuni ta'kidlash kerakki, standart chiziqli dasturiy muammolardan farqli o‘laroq, transport masalasining matematik shakllanishida qulaylik uchun ikkita indeksli o‘zgaruvchilar qo‘llaniladi.

Bu holatda transport muammosining o‘zgaruvchan umumiy soni: m n, bu transport parametrining bir xil indeks bilan mos keladigan matematik formulasini shakllantirish imkonini beradi.

Klassik chiziqli dasturlash transporti muammosi muvozanatli yoki yopiqdir, ya'ni**,** ushbu mahsulotning umumiy ishlab chiqarish hajmining teng iste'mol miqdori iste'molning umumiy hajmiga teng bo‘lgan shaklda shakllantiriladi. Bu shart alohida cheklashlarga mos keladi. Aks holda, agar tenglik saqlanmasa, transport muammosi muvozanatsiz yoki ochiq deb nomlanadi. Amaliyotda transport muammosining turli xil o‘zgarishlari mavjud. Ulardan eng mashhurlari ishlab chiqarish va iste'mol nuqtalarini bog'laydigan transport tarmog'ining tuzilishini aniqlash uchun grafik kabi qo‘shimcha tuzilmalardan foydalanadilar. Tegishli transport muammosi muayyan grafika uchun qo‘llaniladigan tarmoq formulasida shakllantirilishi mumkin, shuning uchun grafikalar bo‘yicha optimallash muammolari sinfiga kiradi. Shu bilan birga, klassik transport muammosi o‘zgaruvchining ayrim yoki barcha o‘zgaruvchan qiymatlarining yuqori chegaralarida shartlar bilan to‘ldirilishi mumkin: $x_{ij} \leq h_{ij}$, **bu erda** hij- i-ishlab chiqarish nuqtasi va iste'mol uchun j-nuqtasi orasidagi transport hajmi. Bunday modifikatsiyani modeldagi qo‘shimcha cheklovlarni kiritishiga olib keladi. Biroq, bu qo‘shimcha cheklovlar MS Excel**2010** dasturidan foydalanib ularni hal qilish jarayoniga sezilarli ta'sir ko‘rsatmaydi.

Ms Excel 2010 dasturi yordamida transport muammosini hal qilish.

Ms Excel 2010 dasturidan foydalanib klassik transport muammosini hal qilish uchun asl vazifa parametrlari uchun aniq qiymatlarni ko‘rsatishingiz kerak.

Neft-gaz quyish stantsiyalari va benzin stantsiyalari o‘rtasida ma'lum bir tovar benzinini tashishning maqbul rejasini aniqlash masalasini ko‘rib chiqish.

Bu holatda, benzinni tashilayotgan mahsulot, ishlab chiqarish nuqtalari sifatida 3 ta neftni qayta ishlash zavodi (t = 3) va iste'mol ballari sifatida 4 ta yoqilg'i quyish stantsiyasi (n = 4) hisoblanadi.

Yoqilg'i ishlab chiqarish hajmi quyidagilardan iborat: № 1- 10, № 2- 14, 3-17 tonna. №1-15, № 2-12, № 3-8.5, № 4-5,5 tonna benzin iste'moli hajmi. Bir tonna benzinni tashish narxi quyidagi jadvalda ko‘rsatilgan:

Iste'mol tovarlari / ishlab chiqarish punktlari	№1	№2	№3	№4
№1	3	5	7	11
№2	1	4	6	3
№3	5	8	12	7

Ko‘rib chiqilgan individual transport muammosining tegishli matematik formulasi quyidagi shaklda yozilishi mumkin:

$$3x11+5x12+7x13+11x14+x21+4x22+6x23+3x24+ +5x31+8x32+12x33+7x34 \rightarrow \min_{X\in\Delta_\beta}.$$

ruxsat etilgan Δ_β alternativalar to‘plami quyidagi tenglik turiga cheklovlar tizimi tomonidan shakllantirilgan:

$$\begin{cases} x_{11}+x_{12}+x_{13}+x_{14}=10; \\ x_{21}+x_{22}+x_{23}+x_{24}=14; \\ x_{31}+x_{32}+x_{33}+x_{34}=17 \\ x_{11}+x_{21}+x_{31}=15; \\ x_{12}+x_{22}+x_{32}=12; \\ x_{13}+x_{23}+x_{33}=8{,}5; \\ x_{14}+x_{24}+x_{34}=5{,}5; \\ x_{ij}\ge 0, \forall i\in\{1,2,3\}, \forall j\in\{1,2,3,4\}. \end{cases}$$

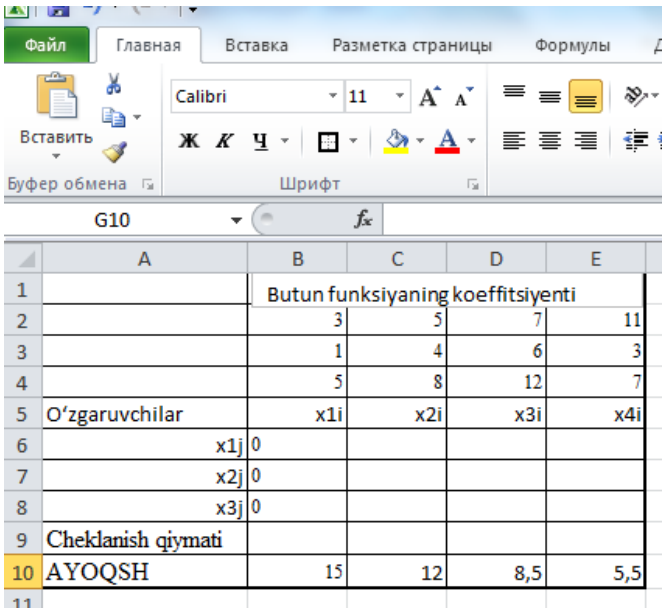
Ushbu vazifaning dastlabki uchta cheklovi umumiy cheklovga, umumiy cheklovga quyidagi 4 ta cheklashlarga va umumiy cheklovga so‘nggi cheklovga mos kelishiga e'tibor bering.

Bunday holda, transport muammosining muvozanatiga mos keladigan umumiy to‘siq, ko‘rib chiqilayotgan alohida muammoning matematik modeliga kiritilmaydi. Bu to‘g'rida to‘g'ridan-to‘g'ri tekshirish sizning umumiy cheklovni amalga oshirishga imkon beradi, ya'ni dastlabki transport vazifasini muvozanatlashtirgan degan ma'noni anglatadi.

MS Excel 2010 yordamida formulali shaxsiy transport muammosini hal qilish uchun **chiziqli** dasturlash kitobida yangi varaq yaratamiz va uning nomini **transport** muammolariga o‘zgartiramiz.

Muammoni hal qilish uchun quyidagi tayyorgarlik bosqichlarini bajaring:

1. Hujayralarda kerakli yozuvlar qilamiz A5:A10, B1, F1. B5:G5, rasmda ko‘rsatilgandek. Shuni ta'kidlash kerakki, ushbu yozuvlarning o‘ziga xos tarkibi ko‘rib chiqilayotgan transport muammosini hal etishga ta'sir qilmaydi.



	A	B	C	D	E
1		Butun funksiyaning koeffitsiyenti			
2		3	5	7	11
3		1	4	6	3
4		5	8	12	7
5	O'zgaruvchilar	x1i	x2i	x3i	x4i
6	x1j	0			
7	x2j	0			
8	x3j	0			
9	Cheklanish qiymati				
10	AYOQSH	15	12	8,5	5,5

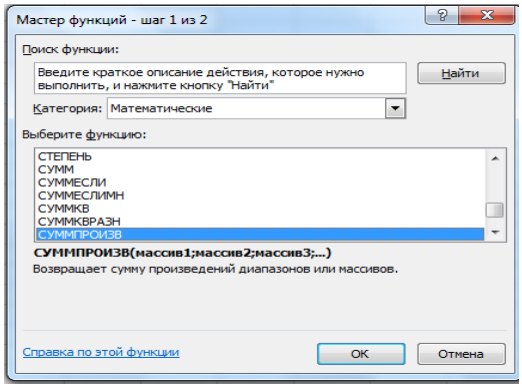
Rasm 3.1.

2. B2: E4 hujayralarida ob'ektiv funktsiyaning koeffitsientlarining qiymatini kiriting.

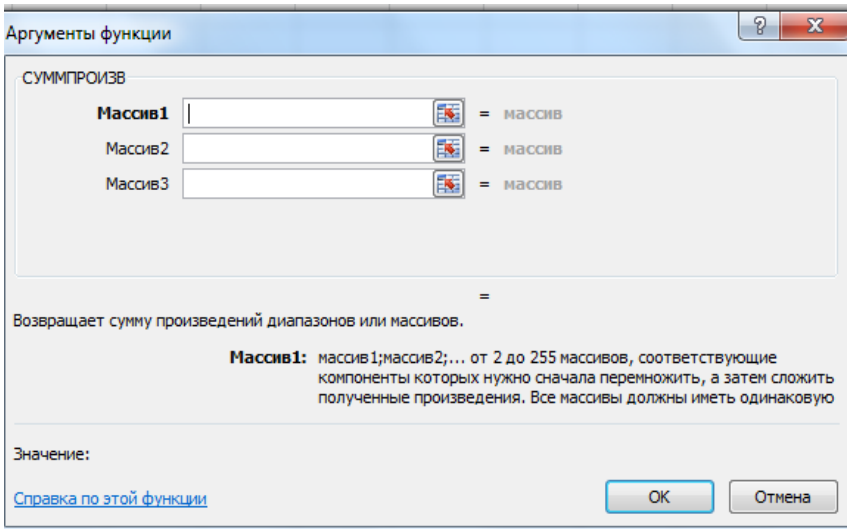
	3	5	7	11
	1	4	6	3
	5	8	12	7

Rasm 3.2.

3. F2 hujayralarida biz formulani kiritamiz: =суммпроизв(B2:E2; B6:E8), bu ob'ektiv vazifani ifodalaydi.



Rasm 3.3.

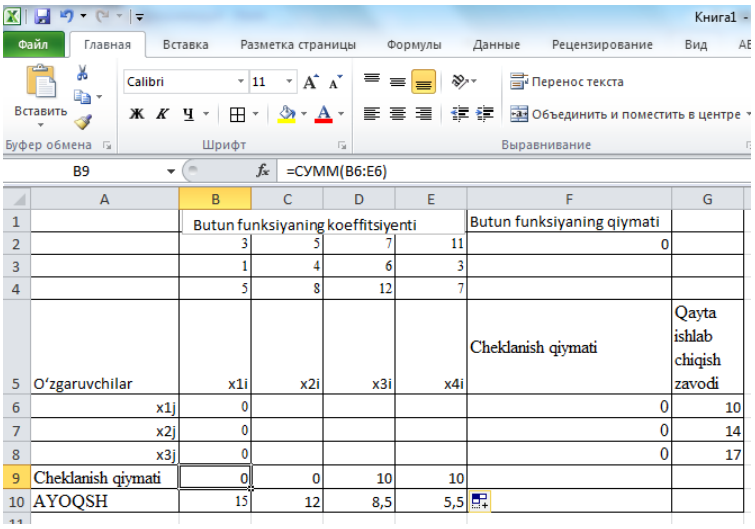


Rasm 3.4.

G6: G8 va **B10: E10** katakchariga cheklovlarning o‘ng tomonlariga mos keladigan qiymatlarni kiriting. **F6** katakchaga quyidagi formula kiriting: =**сумм (B6:E6)**, bu birinchi cheklovni anglatadi. **F6** katakchaga kiritilgan formulani **F7** va **F8** katakcharga nusxalaymiz.

4. B9 **katakchaga** quyidagi formula kiriting: =сумм(B6:B8),bu to‘rtinchi cheklovni ifodalaydi.

5. B9 **katakchaga** kiritilgan formulani C9, D9 **va** E9 **katakchariga nusxalaymiz**.

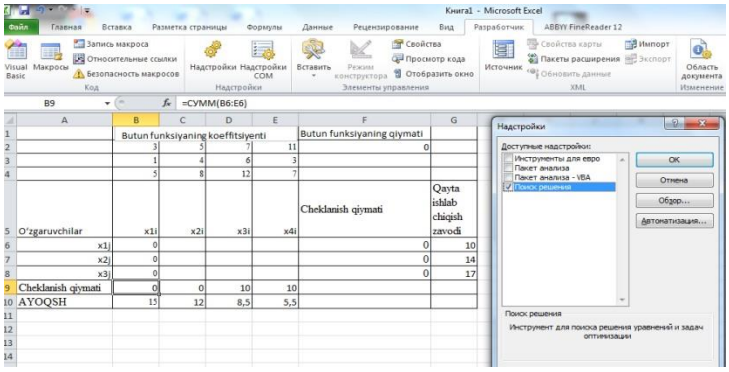


	A	B	C	D	E	F	G
1		Butun funksiyaning koeffitsiyenti				Butun funksiyaning qiymati	
2		3	5	7	11	0	
3		1	4	6	3		
4		5	8	12	7		
5	O‘zgaruvchilar	x1i	x2i	x3i	x4i	Cheklanish qiymati	Qayta ishlab chiqish zavodi
6	x1j	0				0	10
7	x2j	0				0	14
8	x3j	0				0	17
9	Cheklanish qiymati	0	0	10	10		
10	AYOQSH	15	12	8,5	5,5		

Rasm 3.5.

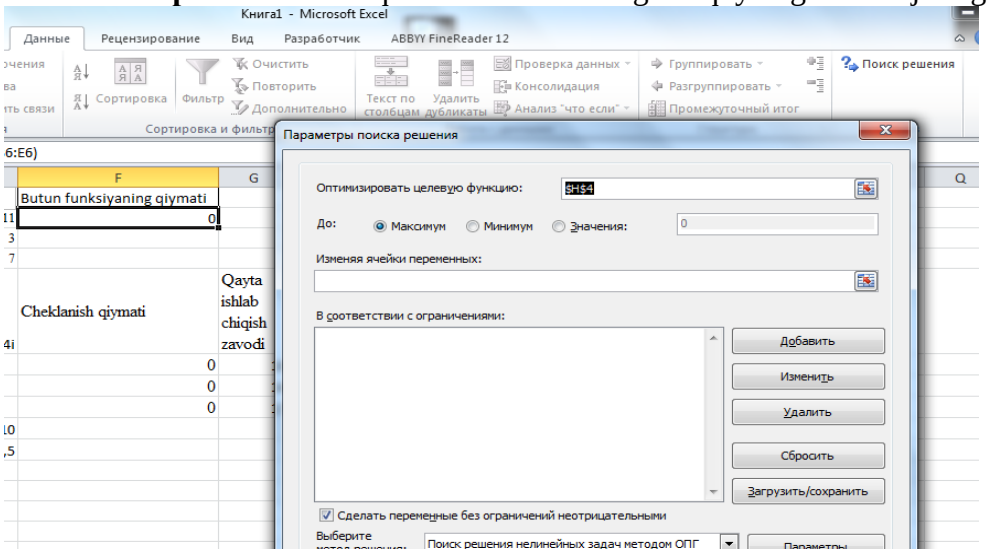
MS Excel **2010** ish varag'ining transport muammosini hal qilish uchun dastlabki ma'lumotlarga ega ko‘rinishi shaklida ko‘rsatilgan.

Muammoni yanada yaxshiroq hal qilish uchun, asosiy menyuning ishlashini amalga oshirish kerak bo‘lgan Разработчик | Поиск решения… bo‘limni oching**.**



Rasm 3.6.

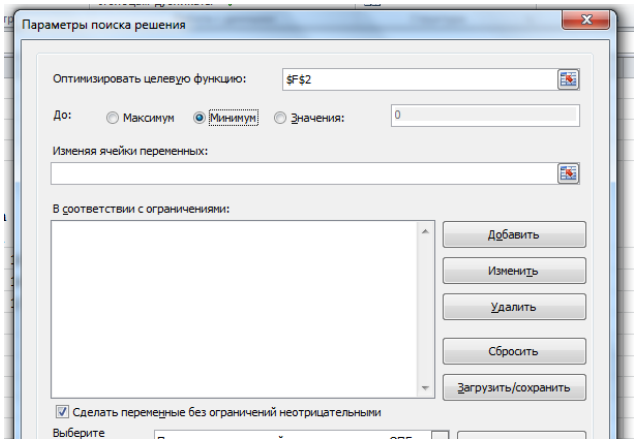
Поиск решения muloqot darchasini oching va quyidagilarni bajaring:



Rasm 3.7.

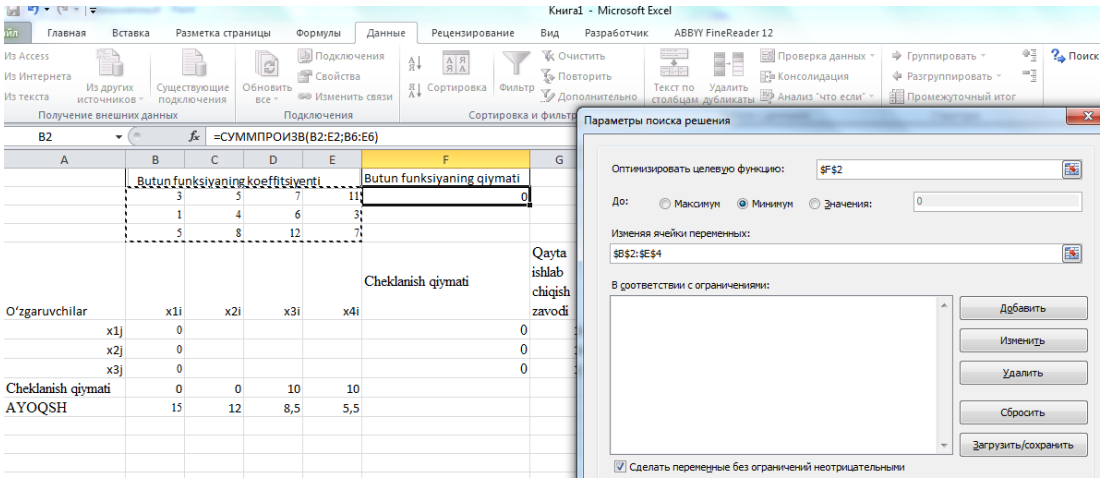
1. Оптимизировать целевую функцию: **maydonida absolyut manzilni** $F$2 **kiriting.**

2. Равной **guruh uchun**: минимум **qidiruv echimini tanlang**.



Rasm 3.8.

3 Изменяя ячейки переменных: **maydonida absolyut manzilni** $B$2:$E$4 **kiriting.**

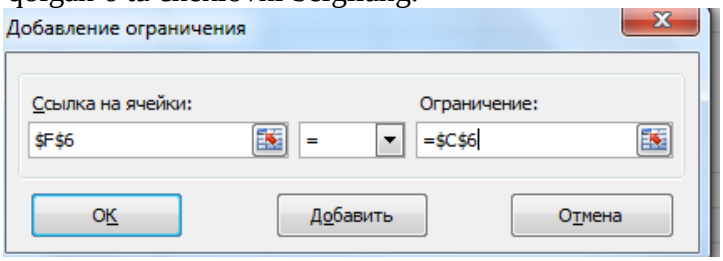


Rasm 3.9.

4.To‘ldirilgan transport muammosining dastlabki formulasini asosiy cheklovlariga mos keladigan 7 ta cheklovlarni qo‘shing. Buning uchun quyidagi amallarni bajaring:для задания Dastlabki cheklashni dastlabki echimlarni Поиск qutisiga o‘rnatish uchun Добавить yorlig'ini bosing; ko‘rsatiladigan qo‘shimcha oynadagi $F$6 **katakchani** tanlang, которая

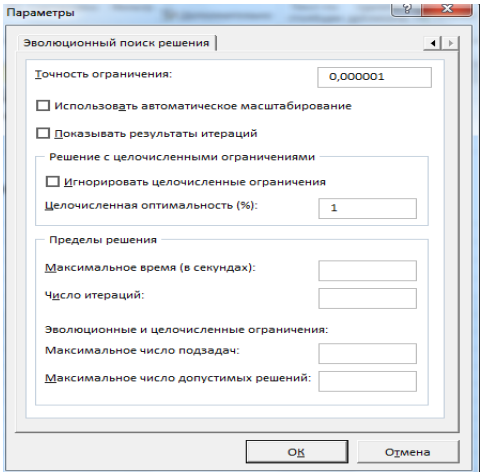
Katakchani Ссылка nomi bilan maydonda paydo bo‘lishi kerak;

- ochiladigan ro‘yxatdagi cheklashlar belgisi sifatida, qattiq tengsizlikni tanlang "=";
- $C$6 **katakchasi** cheklashning o‘ng qismining qiymati sifatida tanlang;
- Qo‘shimcha **darchada** birinchi cheklovni qo‘shish uchun Добавить tugmani bosing;
- shunga o‘xshash qolgan 6 ta cheklovni belgilang.



Rasm 3.10.

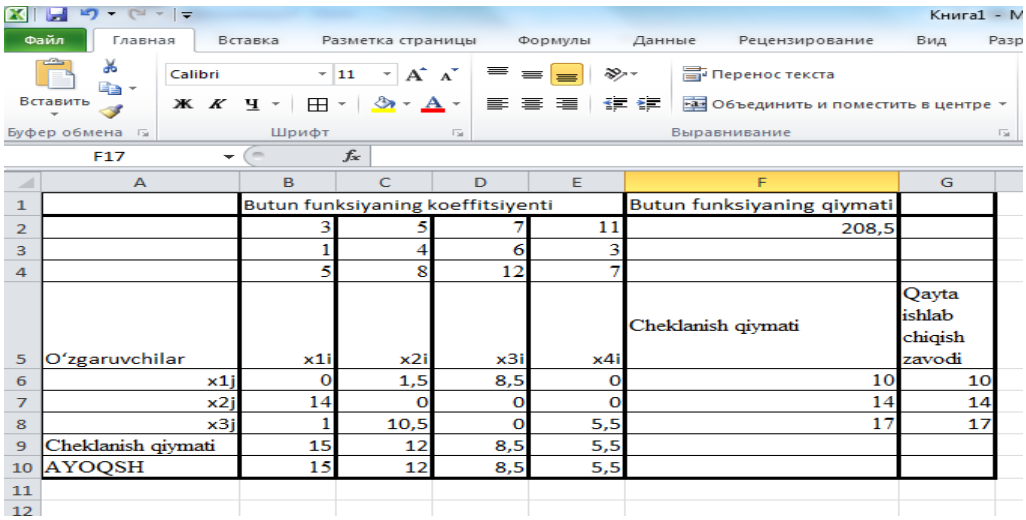
5.Vazifa o‘zgaruvchilarining noan'anaviy qiymatlari bo‘yicha oxirgi cheklovni qo‘shing. Transport muammolariga cheklovlar bilan hal qidirish dialog **darchasi** ko‘rinishi ko‘rsatilgan.



Rasm 3.11.

Cheklovlar va ob'ektiv funktsiyani aniqlaganingizdan so‘ng siz Выполнить tugmachasini bosishingiz kerak bo‘lgan raqamli echimni qidirishga kirishingiz mumkin. Hisob-kitoblarni amalga oshirgandan so‘ng, MS Excel 2010 quyidagilarga o‘xshash bo‘lgan miqdoriy echimga ega

bo‘ladi:



	A	B	C	D	E	F	G
1		Butun funksiyaning koeffitsiyenti				Butun funksiyaning qiymati	
2		3	5	7	11	208,5	
3		1	4	6	3		
4		5	8	12	7		
5	O‘zgaruvchilar	x1i	x2i	x3i	x4i	Cheklanish qiymati	Qayta ishlab chiqish zavodi
6	x1j	0	1,5	8,5	0	10	10
7	x2j	14	0	0	0	14	14
8	x3j	1	10,5	0	5,5	17	17
9	Cheklanish qiymati	15	12	8,5	5,5		
10	AYOQSH	15	12	8,5	5,5		
11							
12							

Rasm 3.12.

4-AMALIYOT ISHI
MATEMATIK MODELLASHTIRISHNI ELEKTRON JADVALIDAGI GRAFIK USULLARI.

O‘zgaruvchan kesimli sterjen tebranishi masalasining matematik modeli va uni yechish usuli.

Maqsad: Talabalarni o‘zgaruvchan kesimli sterjen tebranishi matematik modeli va uni yechish usuli algoritmi bilan tanishtirish hamda unga elektron jadvalga ishlashga o‘rgatish.

Nazariy qism

Uzunligi L ga teng, uchlari sharnirli mahkamlangan, o‘zgaruvchi kesimli sterjenga $q = q(t)$ kuch ta’sir etayotgan bo‘lsin (rasm). Sterjenning tebranish masalasini qarab chiqamiz. Sterjenning tebranish funksiyasi (progib)ni $W(x,t)$ deb belgilaylik. U holda kuchlanish va deformatsiya orasidagi bog‘lanish

$$\sigma = E\varepsilon \qquad (1)$$

ko‘rinishda, $W(x,t)$ va ε deformatsiya orasidagi bog‘lanish esa quyidagi ko‘rinishga ega bo‘ladi:

$$\varepsilon = -z\frac{\partial^2 W}{\partial x^2} \qquad (2)$$

Sterjenning tebranish masalasida inersion kuch hosil bo‘lib, harakat tenglamasi quyidagi munosabat yordamida ifodalanadi

$$\frac{\partial^2 M}{\partial x^2} + q = m\frac{\partial^2 W}{\partial t^2} \qquad (3)$$

Bu yerda t-vaqt; m-sterjen massasi; $q = q(t)$-sterjenga ta’sir etayotgan kuch; $M = \iint_F z\sigma dF$ - inersiya momenti.

(1), (2) va (3) yordamida sterjenning tebranishini ifodalovchi

$$\frac{\partial^2}{\partial x^2}\left[EJ(x)\frac{\partial^2 W}{\partial x^2}\right] + m\frac{\partial^2 W}{\partial t^2} = q(t) \qquad (4)$$

xususiy hosilali differensial tenglamani hosil qilamiz.

(4) tenglama $x = 0$ va $x = L$ larda quyidagi chegaraviy

$$W = 0; \quad \frac{\partial^2 W}{\partial x^2} = 0 \qquad (5)$$

va $t = 0$ da boshlang‘ich

$$W = \varphi(x), \quad \frac{\partial W}{\partial t} = \psi(x) \tag{6}$$

shartlar bilan birgalikda, sterjenning tebranishi haqidagi masalasining matematik modelini tashkil etadi.

Xususiy holda $F = const$ bo‘lsa, u holda

$$EJ\frac{\partial^2}{\partial x^2}\left(\frac{\partial^2 W}{\partial x^2}\right) + m\frac{\partial^2 W}{\partial t^2} = q(t)$$

tenglamani olamiz.

(4) –(6) da quyidagi $\overline{W} = \frac{W}{W_0}$, $\overline{x} = \frac{x}{l}$, $\overline{J(x)} = \frac{J(x)}{J_0}$, $\overline{m} = \frac{m}{m_0}$, $\overline{t} = \sqrt{\frac{EJ_0}{m_0 l^4}} \cdot t$,

$\overline{q} = \frac{l^4}{EW_0 J_0} q$ almashtirishlarni bajarib (va oldingi belgilashlarni saqlab qolib) quyidagi

$$m(x)\frac{\partial^2 W}{\partial t^2} + \frac{\partial^2}{\partial x^2}\left[J(x)\frac{\partial^2 W}{\partial x^2}\right] = q(t) \tag{7}$$

xususiy hosilali differensial tenglamani hosil qilamiz. (5) va (6) shartlar esa $x = 0$ va $x = 1$ da

$$W(x,t) = 0, \qquad \frac{\partial^2 W(x,t)}{\partial x^2} = 0 \tag{8}$$

va $t = 0$ da

$$W(x,t) = \varphi(x), \qquad \frac{\partial W(x,t)}{\partial t} = \psi(x) \tag{9}$$

ko‘rinishni oladi.

Bubnov-Galyorkin usuliga ko‘ra (7) tenglamaning (8) shartni qanoatlantiruvchi yechimini

$$W(x,t) = \sum_{n=1}^{N} y_n(t)\sin n\pi x \tag{10}$$

ko‘rinishda qidiramiz. (10) ni (7) ga qo‘yib

$$\sum_{n=1} y_n''(t)\sin n\pi x + \sum_{n=1} y_n(t)[J(x)(n\pi)^4 \sin n\pi x - 2J'(x)(n\pi)^3 \cos n\pi x -$$

$$- J''(x)(n\pi)^2 \sin n\pi x]\frac{1}{m(x)} = \frac{q(t)}{m(x)}$$

tenglikni hosil qilamiz.

Bu tenglikni ikkala tomonini $\sin m\pi x$ ga ko‘paytirib, uni 0 dan 1 gacha integrallaymiz va natijada

$$y_m''(t)+\sum_{n=1}^{N}a_{mn}y_n(t)=q_m(t),\qquad m=1,2,...,N \tag{11}$$

ko‘rinishdagi oddiy differensial tenglamalar sitemasiga ega bo‘lamiz. Bu yerda

$$a_{mn}=2\int_0^1[\,J(x)(n\pi)^4\sin n\pi x-2J'(x)(n\pi)^3\cos n\pi x-$$

$$-J''(x)(n\pi)^2\sin n\pi x]\,\frac{\sin m\pi x}{m(x)}dx$$

$$q_m(t)=q(t)\int_0^1\frac{\sin m\pi x}{m(x)}dx$$

(11) tenglamalar sistemasi uchun boshlang‘ich shartlar quyidagi

$$y_m(0)=y_{mo},\qquad y_m'(0)=y_{m1} \tag{12}$$

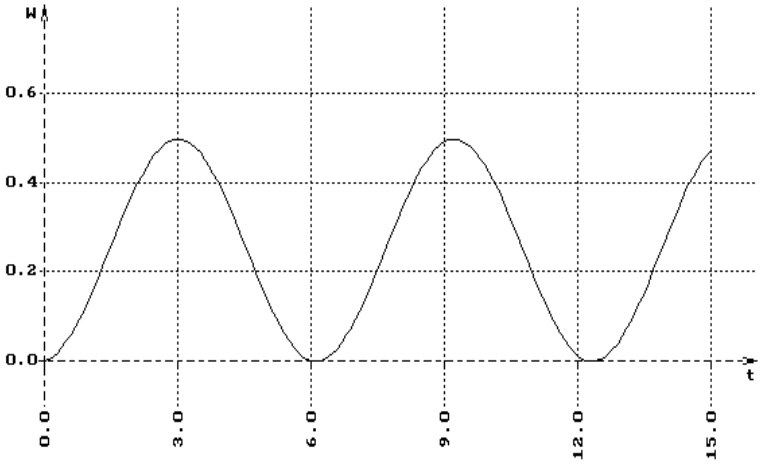
ko‘rinishni oladi. Bu yerda

$$y_{m0}=2\int_0^1\varphi(x)\sin m\pi\pi xd,\quad y_{m1}=2\int_0^1\psi(x)\sin m\pi\pi xd$$

(11), (12) Koshi masalasini Runge-Kutta usulida yechamiz. Topilgan $y_n(t)$ ni (10) ga olib borib qo‘yamiz va sterjenning tebranish $W(x,t)$ funksiyasi aniqlaymiz.

Misol 1. Ushbu $J(x)=1+0{,}1\cdot x$, $\varphi(x)=\psi(x)=0$, $m(x)=100$, $q(x)=20$ lar uchun sterjen o‘rtasining($x=0{,}5$) tebranishini aniqlang va uni grafik ko‘rinishda tasvirlang.

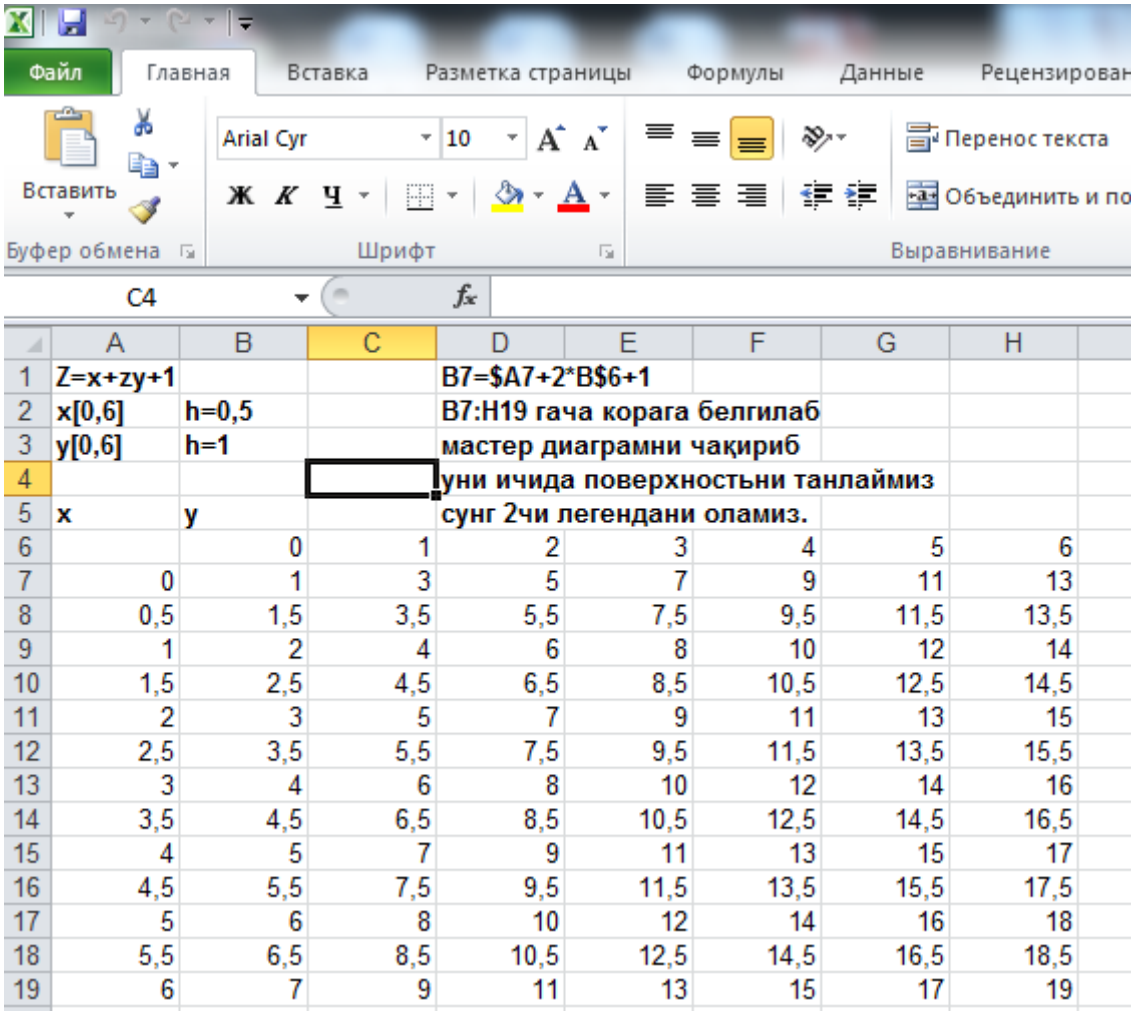
Yechish. $n=3$, $nt=151$, $ht=0{,}1$ lar uchun, yuqorida keltirilgan dasturdan foydalanib berilgan masalaning sonli yechimi olindi va natija quyidagi grafikda tasvirlangan.



Rasm 4.1.

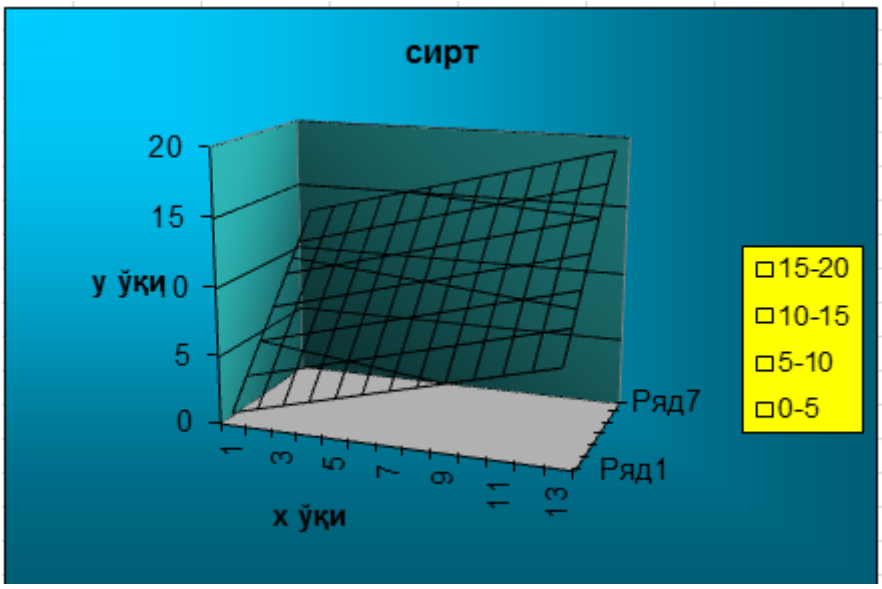
Sterjen tebranishini aniqlashga elektron jadvaldagi qo‘rinishi:

Misol 2.



	A	B	C	D	E	F	G	H
1	Z=x+zy+1			B7=$A7+2*B$6+1				
2	x[0,6]	h=0,5		B7:H19 гача корага белгилаб				
3	y[0,6]	h=1		мастер диаграмни чақириб				
4				уни ичида поверхностьни танлаймиз				
5	x	y		сунг 2чи легендани оламиз.				
6		0	1	2	3	4	5	6
7	0	1	3	5	7	9	11	13
8	0,5	1,5	3,5	5,5	7,5	9,5	11,5	13,5
9	1	2	4	6	8	10	12	14
10	1,5	2,5	4,5	6,5	8,5	10,5	12,5	14,5
11	2	3	5	7	9	11	13	15
12	2,5	3,5	5,5	7,5	9,5	11,5	13,5	15,5
13	3	4	6	8	10	12	14	16
14	3,5	4,5	6,5	8,5	10,5	12,5	14,5	16,5
15	4	5	7	9	11	13	15	17
16	4,5	5,5	7,5	9,5	11,5	13,5	15,5	17,5
17	5	6	8	10	12	14	16	18
18	5,5	6,5	8,5	10,5	12,5	14,5	16,5	18,5
19	6	7	9	11	13	15	17	19

Rasm 4.2.



Rasm 4.3.

5-AMALIYOT ISHI
MATHCAD DASTURI MUXITI BILAN TANISHISH. SODDA HISOBLASHLAR BAJARISH.

Maqsad: Mathcad tizimida ishlash haqida tushunchaga ega bo‘lish.Matematika ifodalarni hisoblash boyicha masalalar yechishni o‘rganish.

Nazariy qism

Mathcad tizimi va unda ishlash texnologiyasi

Matematik paketlar, ayniqsa Mathcad –mashhur paket bo‘lib, ilmiy – texnikaviy soha mutaxassislariga dasturlashning nozik elementlariga e’tibor berilmasdan (masalan:fortran, C, paskal, BASIC va boshqalar kabi) kompyuterda matematik modellashtirishni amalga oshirishga katta yordam beradi.

Mathcad 1986-yilda Massachueset texnika unversitetida olim Allen Razdov tomonidan yaratilgan.Hozirgi kunda Mathcad dasturini qullab versiyalari (variantlari) yaratilgan bo‘lib, ulardan oxirgisi Mathcad s 1.0 po 4.xx, Mathcad 1.0 dan 15 versiyalarigacha ishlab chiqarilgan. Tabiiyki, har bir variant uzidan oldingisidan foydalanish uchun qulayligi va boy imkoniyatlari bilan farq qiladi.

Quyida Mathcad matematik dasturlash muhitida ishlashning yaqqol ajralib turadigan imkoniyatlarini sanab o‘tmoqchimiz:

- **Mathcad** muhitida matematik ifoda, qabul qilingan ko‘rinishda ifodalanadi. Masalan, daraja yuqorida, indeks pastda, integralning yuqori va quyi chegaralari esa an’anaviy joyida turadi.
- **Mathcad** muhitida “dasturlashni” tuzish va ularning bajarilish jarayoni parallel kechadi. Foydalanuvchi **Mathcad** – hujjatida yangi ifoda kiritar ekan, uning qiymatini hisoblash va ifodani kiritishda yo‘l qoyilgan yashirin xatoliklarni grafigini ko‘rish imkoniyati ham mavjud.
- **Mathcad** paketi yetarli darajada qudratli matematik apparat bilan qurollanganki, ular orqali tashqi pratseduralarni chaqirmasdan turib paydo bo‘ladigan muammolarni hal qilishimiz mumkin.

Mathcadga xos bo‘lgan ayrim hisoblovchi qurilmalarni sanab o‘tmoqchimiz:

- Chiziqli va chiziqli bo‘lmagan algebraik tenglama va sistemalarni yechish;
- Oddiy differensial tenglama va sistemalarni (Koshi masalasi va chegaraviy masala) yechish;
- Xususiy hosilali differensial tenglamalarni yechish;
- Berilganlarni static qayta ishlov berish (interpolyatsiya, ekstrapolyatsiya, approksimatsiya va ko‘pgina boshqa amallar);
- Vektor va matritsalar bilan ishlash (chiziqli algebra va boshqalar);
- Funksional bog’liqlikning maksimum va minimumini izlash.

Mathcad paketi matematik va fizik-kimyoviy formulalarga, hamda o‘zgarmaslarga asoslangan yordamchi qo‘llanmalar bilan boyitilgan.

Foydalanuvchi o‘z oldiga qoyilgan masalani yechish bilan cheklanibgina qolmay, fizikaviy masalalarni yechishda o‘lchovni hisobga olish imkoniyatiga ega. Bunda foydalanuvchi birliklar sistemasini ham tanlashi mumkin.

Matematik ifodalarni qurish va hisoblash.

Tahrirlashda klaviaturadan ham foydalanish mumkin, masalan boshlang`ich holatda ekranda kursor krestik ko`rinishda bo`ladi. Ifodani kiritishda u kiritilayotgan ifodani egallab olgan ko`k burchakli holatga o`tadi. Mathcadning har qanday operatorini kiritishni uchta usulda bajarish mumkin:

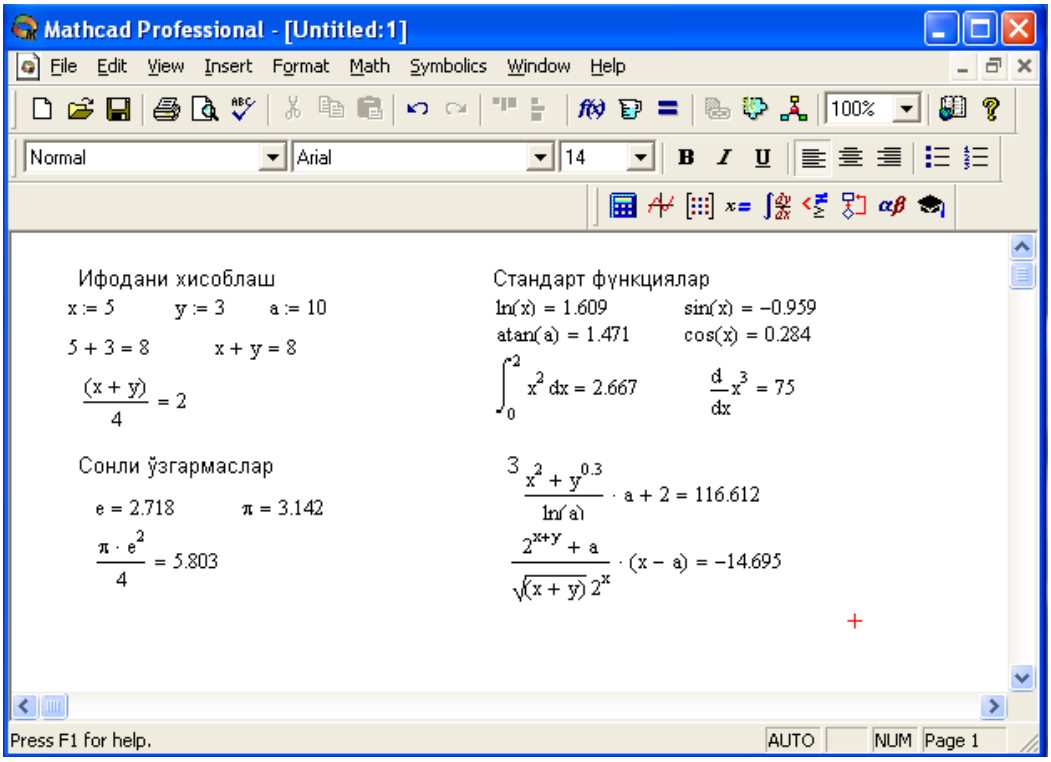
- menyu buyrug`idan foydalanib;
- klaviatura tugmalaridan foydalanib;
- matematik paneldan foydalanib.

O`zgauvchilarga qiymat berish uchun yuborish operatori ":=" ishlatiladi. Hisoblashlarni amalga oshirish uchun oldin formuladagi o`zgaruvchi qiymatlari kiritiladi, keyin matematik ifoda yozilib tenglik "=" belgisi kiritiladi, natijada ifoda qiymati hosil bo`ladi.

Oddiy va matematik ifodalarni tahrirlashda menyu standart buyruqlaridan foydalaniladi.

- qirqi bo'lish – Ctrl+x;
- nusxa olish – Ctrl+c;
- qo`yish – Ctrl+v;
- bajarishni bekor qilish – Ctrl+z.

Oddiy matematik ifodalarni hisoblash quyidagi rasmda keltirilgan:



Rasm 5.1.

Diskret o`zgaruvchilar va sonlarni formatlash.

Mathcadda diskret o`zgaruvchilar deganda sikl operatorini tushunish kerak. Bunday o`zgaruvchilar ma'lum qadam bilan o`suvchi yoki kamayuvchi sonlarni ketma-ket qabul qiladi. Masalan:

x:=0..5. Bu shuni bildiradiki bu o`zgaruvchi qiymati qator bir necha qiymatlardir, ya'ni x=0,1,2,3,4,5.

x:=1,1.1..5. Bunda 1 – birinchi sonni, 1,1 – ikkinchi sonni, 5 - oxirgi sonni bildiradi.

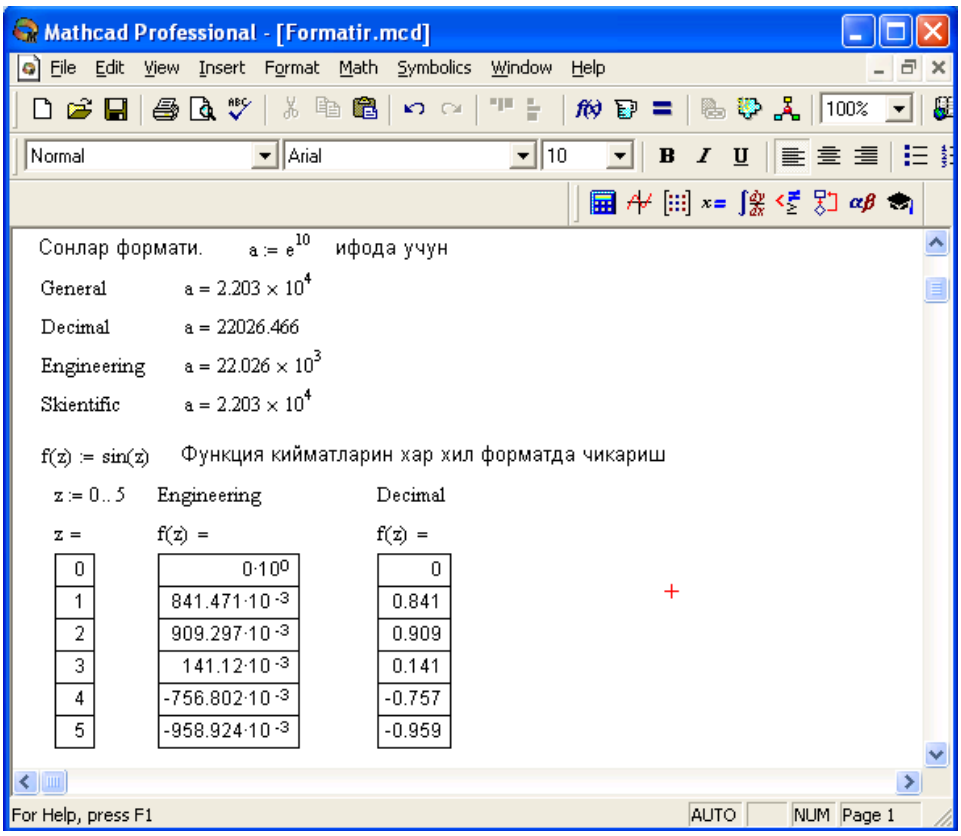
x:=A,A+B..B. Bunda A – birinchi, A+B – ikkinchi, B - oxirgi sonni bildiradi.

Izoh! O`zgaruvchi diapazonini ko`rsatishda ikki nuqta o`rniga klaviaturadan (;) nuqta vergul kiritiladi yoki Matrix (Matritsa) panelidan Range Variable (Diskret o`zgaruvchi) tugmasi

bosiladi. Hisoblangan qiymatni chiqarish uchun esa o`zgaruvchi va tenglik belgisini kiritish kifoY. Natijada o`zgaruvchi qiymati ketma-ket jadvalda chiqadi. Masalan, x:=0..5 deb yozib, keyin x= kiritish kerak.

Foydalanuvchi funktsiyaning uning argumentiga mos qiymatlarini hisoblab chiqarish va bu qiymatlarni jadval yoki grafik ko`rinishda tasvirlashda diskret o`zgaruvchilardan foydalanish qulaylikni keltiradi. Masalan, f(x)=sin(x)·Cos(x) funktsiya qiymatlarini x ning 0 dan 5 gacha bo`lgan qiymatlarida hisoblash kerak bo`lsa, u holda quyidagi kiritishni amalga oshirish kerak: f(x)=sin(x)·Cos(x) x:=0..5 f(x)=*javob.*

Sonlarni formatlash. Odatda Mathcad 20 belgi aniqligigacha matematik ifodalarni hisoblaydi. Hisoblash natijalarini kerakli formatga o`zgartirish uchun sichqoncha ko`rsatgichini sonli hisob chiqadigan joyga keltirib, ikki marta tez-tez bosish kerak. Natijada sonlarni formatlash natijasi Result Format oynasi paydo bo`ladi.



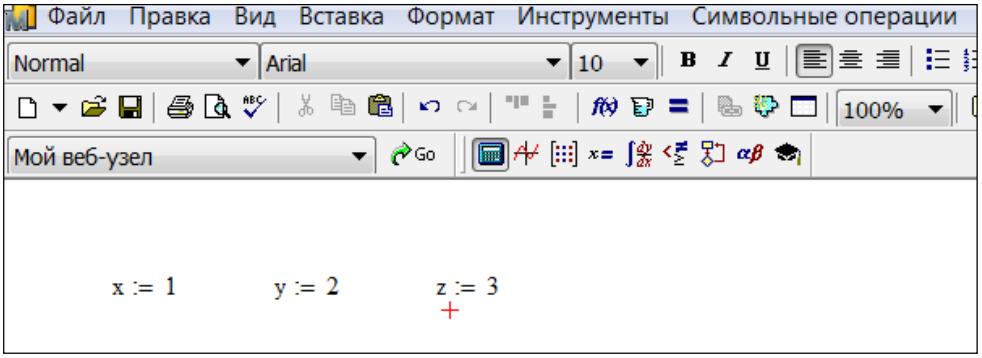
Rasm 5.2.

Mathcad tizimida ishlash. Sodda hisoblashlar bajarishboyichatopshiriqlar.

1) x,y,z o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

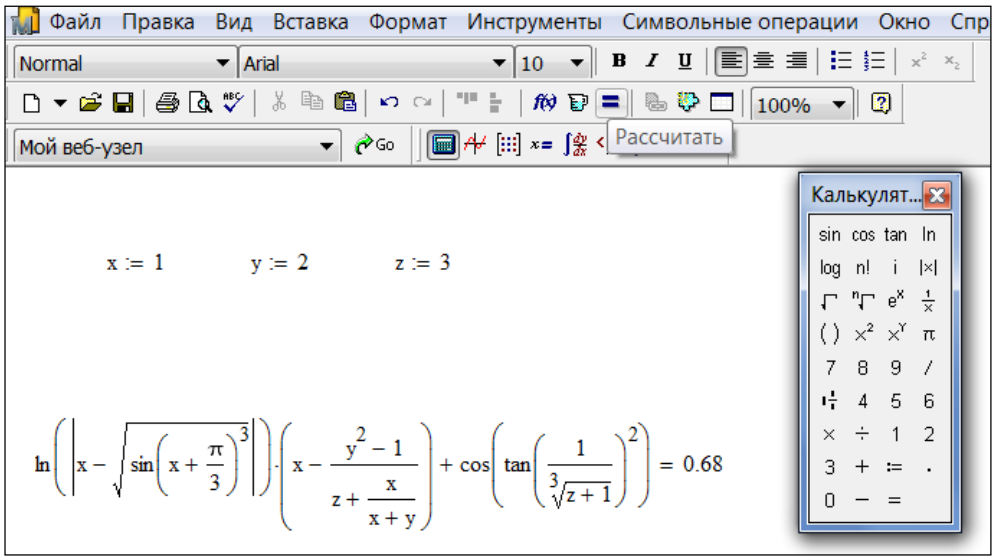
$$\ln\left|\left(x-\sqrt{\sin^3\left(x+\frac{\pi}{3}\right)}\right)\right|\left[x-\frac{y^2-1}{z+\frac{x}{x+y}}\right]+\cos\left[tg^2\left[\frac{1}{\sqrt[3]{z+1}}\right]\right]$$

Dastlab o‘zgaruvchilarning qiymatini kiritamiz:



Rasm 5.3.

So‘ngra **Калькулятор** paketidan foydalanib, ifodani kiritamiz; (=) (tenglik) belgisini bosib,natijaga erishamiz.

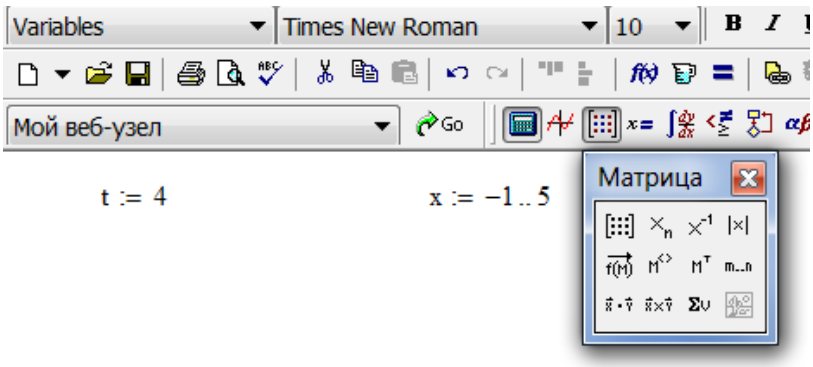


Rasm 5.4.

2) [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling:

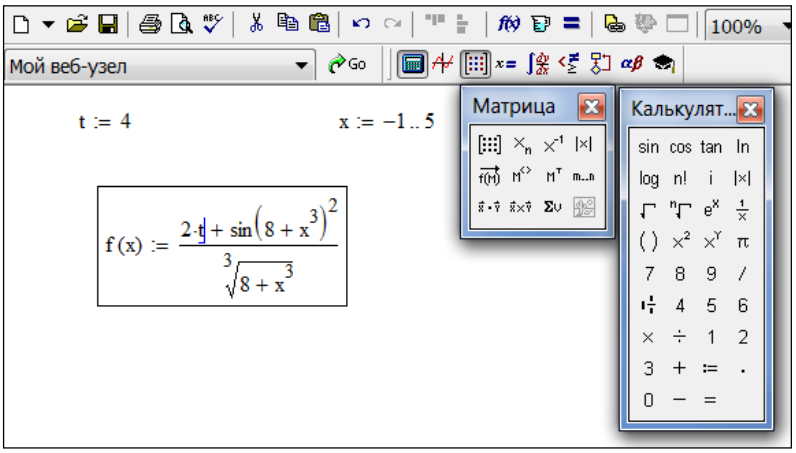
$$d = \frac{2m + \sin^2(8 + x^3)}{\sqrt[3]{8 + x^3}}, m = 4, a = -1, b = 5, h = 1.$$

Dastlab o‘zgaruvchilarni kiritamiz; [-1,5] oraliqni kiritish uchun **Матрица** paketining (**m..n)** amalidan yoki klaviaturadagi (**J)** klavishidan foydalanamiz.



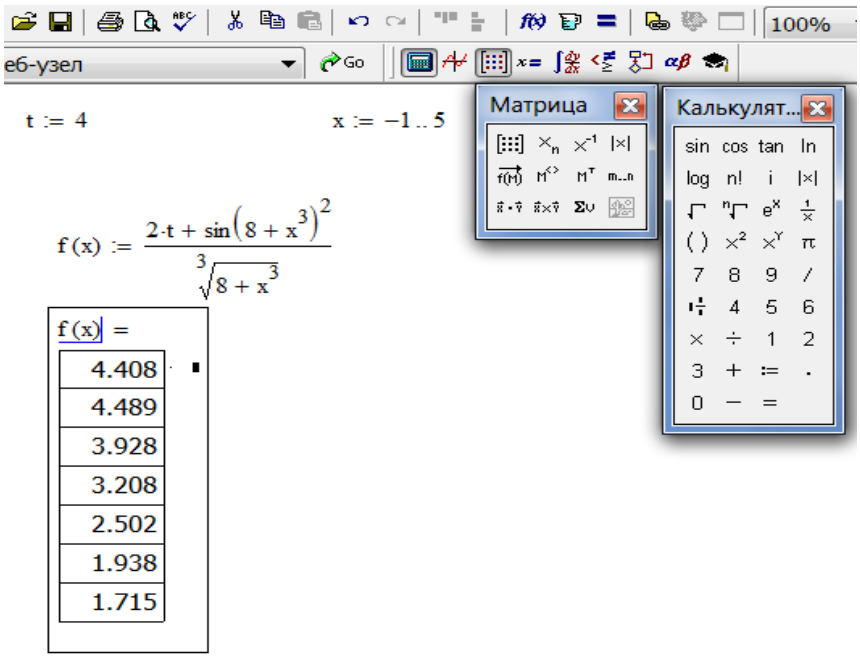
Rasm 5.5.

So‘ngra **Калькулятор** paketidan foydalanib funksyani quyidagicha kiritamiz:



Rasm 5.6.

Funksiyaning berilgan oraliqdagi qiymatlarini toppish uchun so‘ngi amalni bajaramiz:



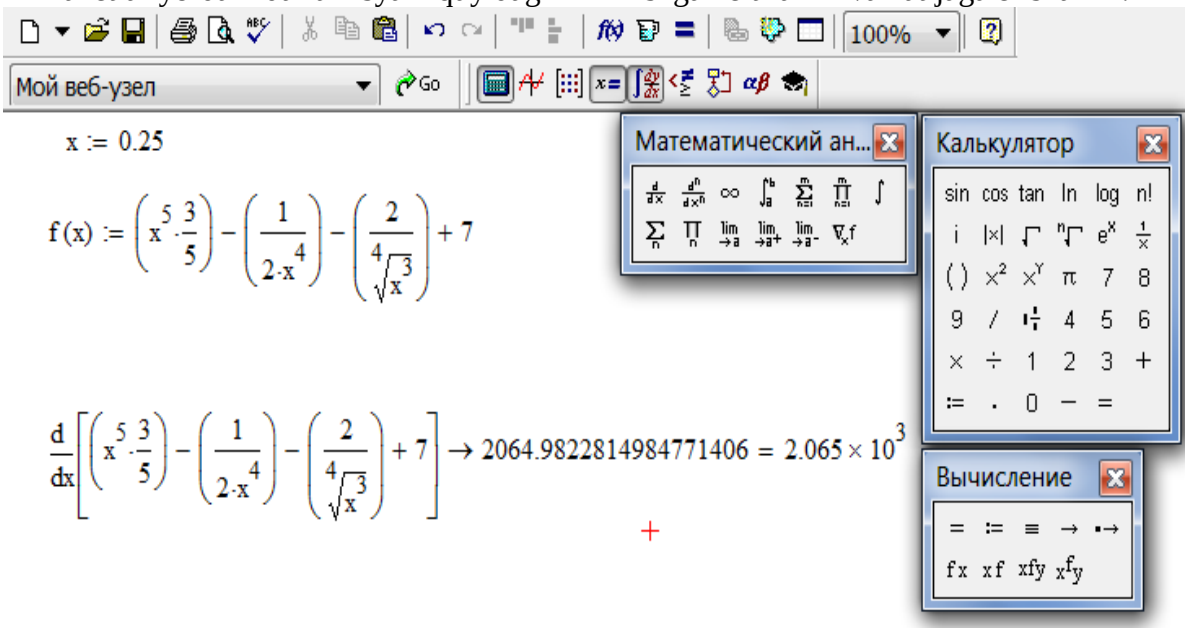
Rasm 5.7.

3) x=0.25 Funksiya hosilasini berilgan qiymatda hisoblang:

$$f(x) := \left(x^{5}\cdot\frac{3}{5}\right) - \left(\frac{1}{2\cdot x^{4}}\right) - \left(\frac{2}{\sqrt[4]{x^{3}}}\right) + 7$$

Ushbu fuksiyani xosilasini hisoblash uchun **Математические** panelidagi **Вычисление Математические** va **Калькулятор** paketlari kerak bo‘ladi.

Paketlar yordamida funksyani quyidagi ko‘rinishga keltiramiz va natijaga erishamiz:

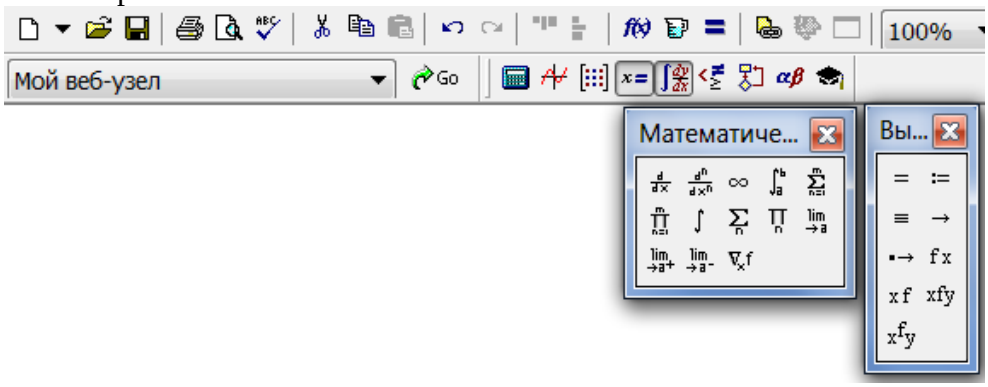


Rasm 5.8.

4) Quyidagi limitni toping:

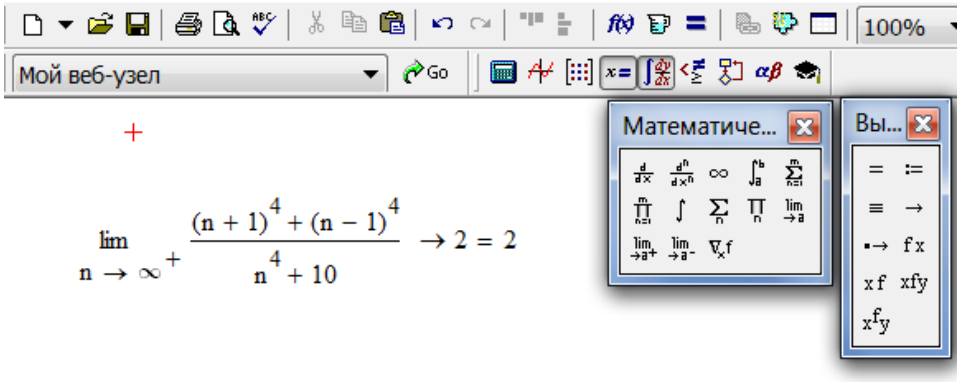
$$\lim_{n\to\infty}\frac{(n+1)^4+(n-1)^4}{n^4+10}$$

Ushbu limitni toppish uchun bizga **Математические** panelidagi **Калькулятор** va **Вычисление** paketlari kerak bo‘ladi:



Rasm 5.10.

Dastlab ifodani kiritamiz va natijaga erishish uchun **Вычисление** paketidan foydalanamiz:

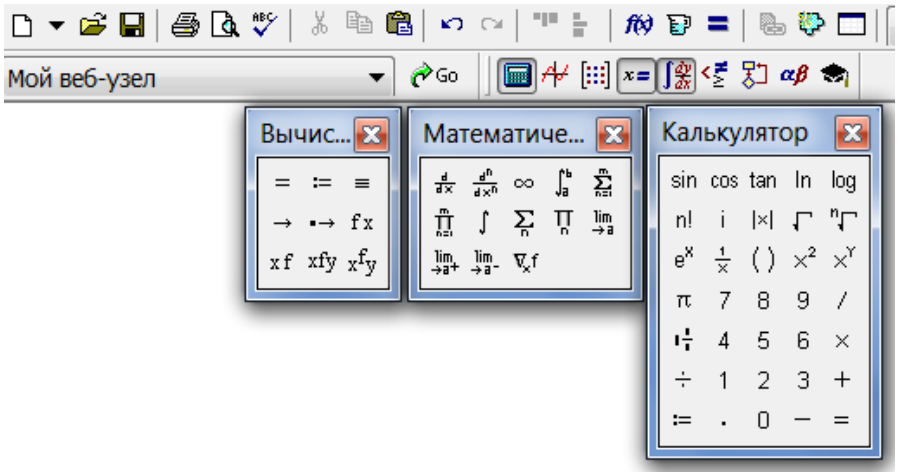


Rasm 5.11.

5) Aniq integralni hisoblang va natijani solishtiring:

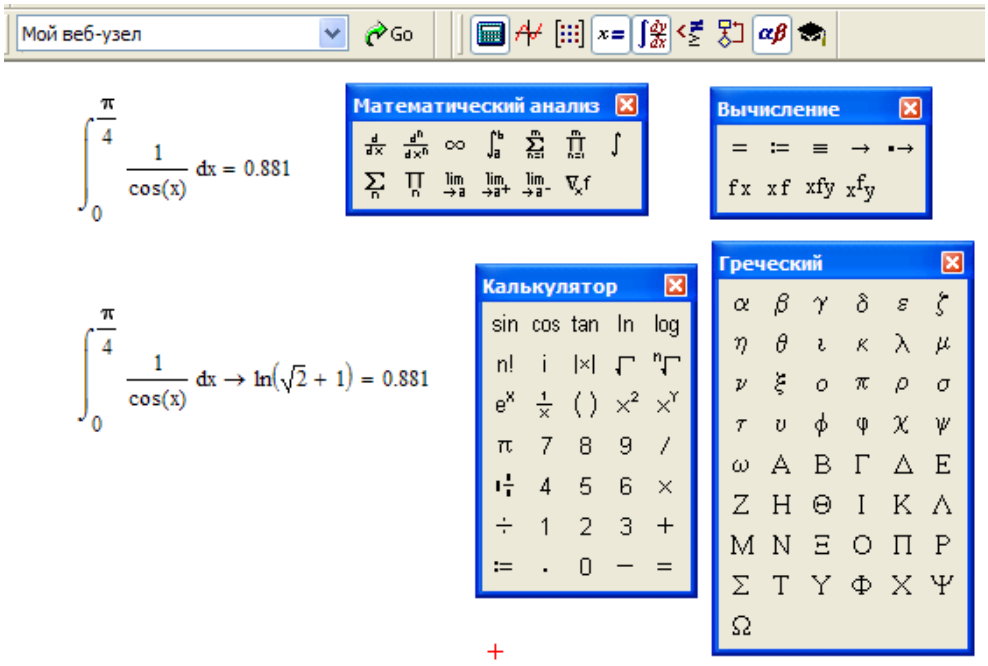
$$\int_0^{\frac{\pi}{4}} \frac{1}{\cos(x)}\,dx \to \ln(\sqrt{2}+1) = 0.881 \int_1^4 e^x \left(1 - \frac{e^{-x}}{x^2}\right) dx = 51.13$$

Ushbu aniq integrallarni hisoblash uchun **математические** panelidagi **Калькулятор, Вычисление,** va **Математический анализ** paketlaridan foydalanamiz.



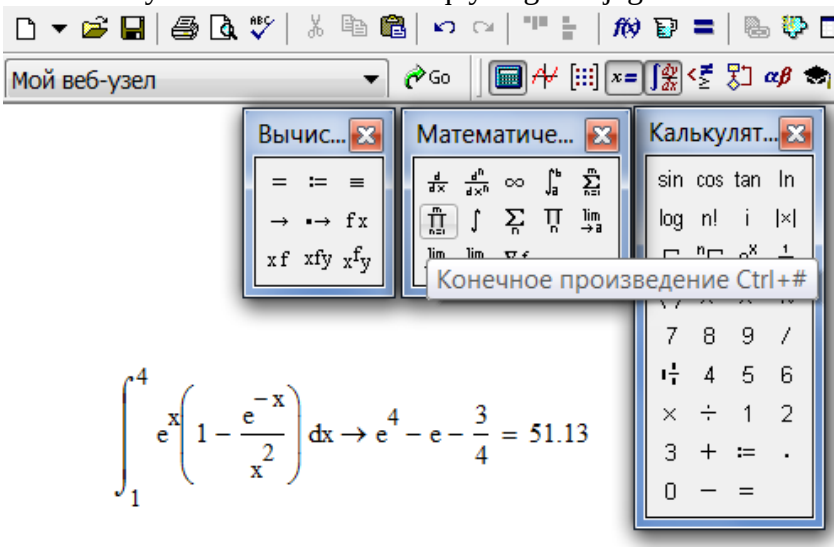
Rasm 5.12.

So‘ng aniq integralni kiritib, quyidagi natijaga erishamiz:



Rasm 5.12.

Grek alifbosi harflarini ishlatish uchun Γrecheskiy paketlaridan ham foydalandik. 2-aniq integralni shunday tartibda kiritamiz va quyidagi natijaga erishamiz:



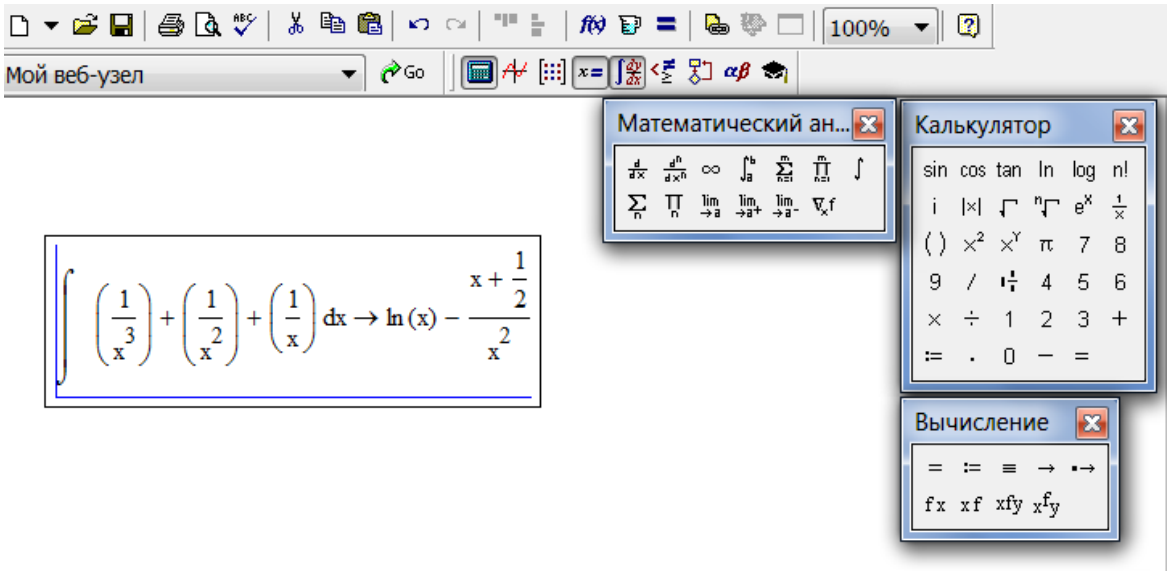
Rasm 5.13.

6) Aniqmas integralni hisoblang va natijani solishtiring:

7)

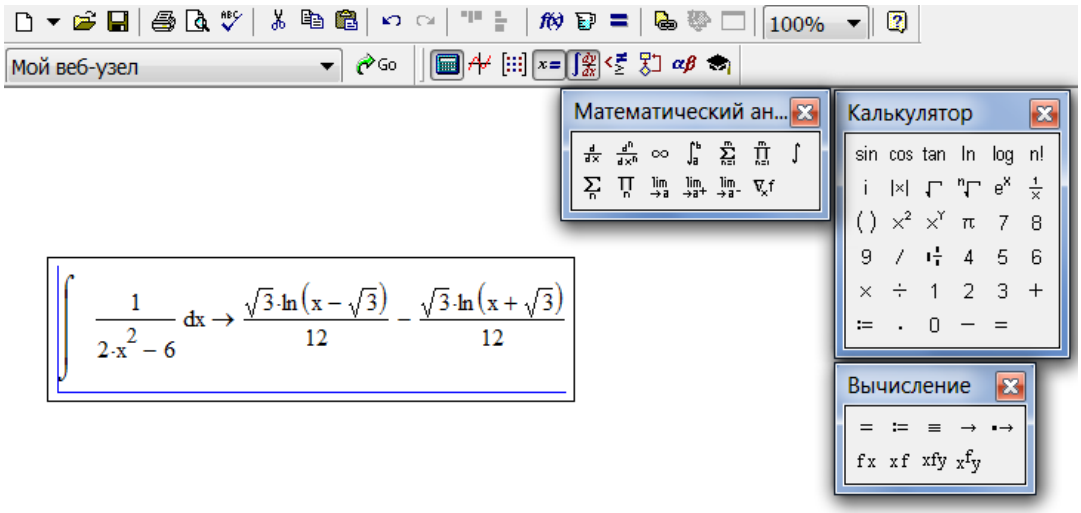
$$\int\left(\frac{1}{x^3}+\frac{1}{x^2}+\frac{1}{x}\right)dx \to \frac{-1}{(2x^2)}-\frac{1}{x}+\ln(x)\int\frac{1}{2x^2-6}dx \to \frac{-1}{6}\cdot\sqrt{3}\cdot a\tanh\left(\frac{1}{3}\cdot x\cdot\sqrt{3}\right)$$

Ushbu aniqmas integrallarni hisoblash uchun **Математические** panelidagi **Калькулятор, Вычисление** va **Математический анализ** paketlaridan foydalanamiz. So‘ng aniqmas integrallarni kiritib, quyidagi natijalarga ega bo‘lamiz:



$$\int \left(\frac{1}{x^3}\right) + \left(\frac{1}{x^2}\right) + \left(\frac{1}{x}\right) dx \rightarrow \ln(x) - \frac{x + \frac{1}{2}}{x^2}$$

Rasm 5.14.



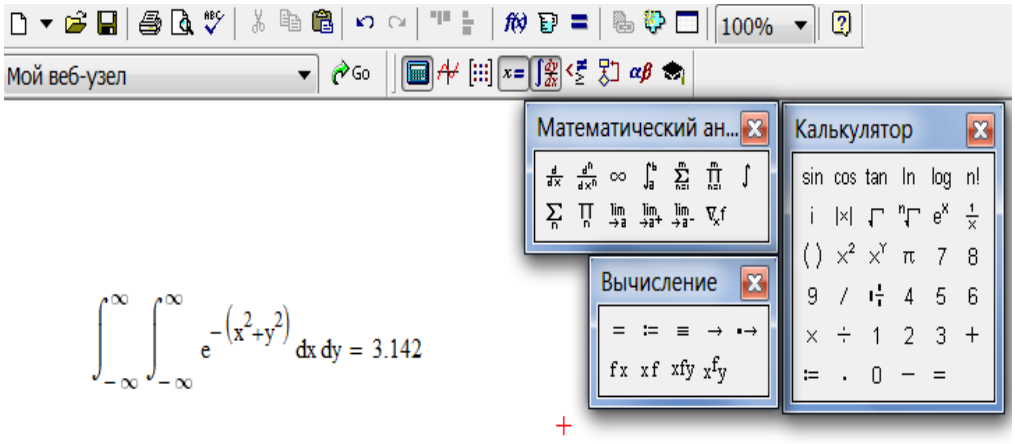
$$\int \frac{1}{2 \cdot x^2 - 6} dx \rightarrow \frac{\sqrt{3} \cdot \ln\left(x - \sqrt{3}\right)}{12} - \frac{\sqrt{3} \cdot \ln\left(x + \sqrt{3}\right)}{12}$$

Rasm 5.15.

8) Karrali integralni hisoblang va natijani solishtiring:

$$\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} e^{-\left(x^2+y^2\right)} dx\ dy = 3.142$$

Ushbu karrali integrallarni hisoblash uchun **Математические** panelidagi **Калькулятор, Вычисление** va **Математический анализ** paketlaridan foydalanamiz. Ishchi sohaga karrali integralni kiritib, quyidagi natijani hosil qilamiz:



Rasm 5.16.

6-AMALIYOT ISHI
MATHCAD PAKETIDA VEKTORLAR VA MATRITSALAR USTIDA ISH OLIB BORISH.

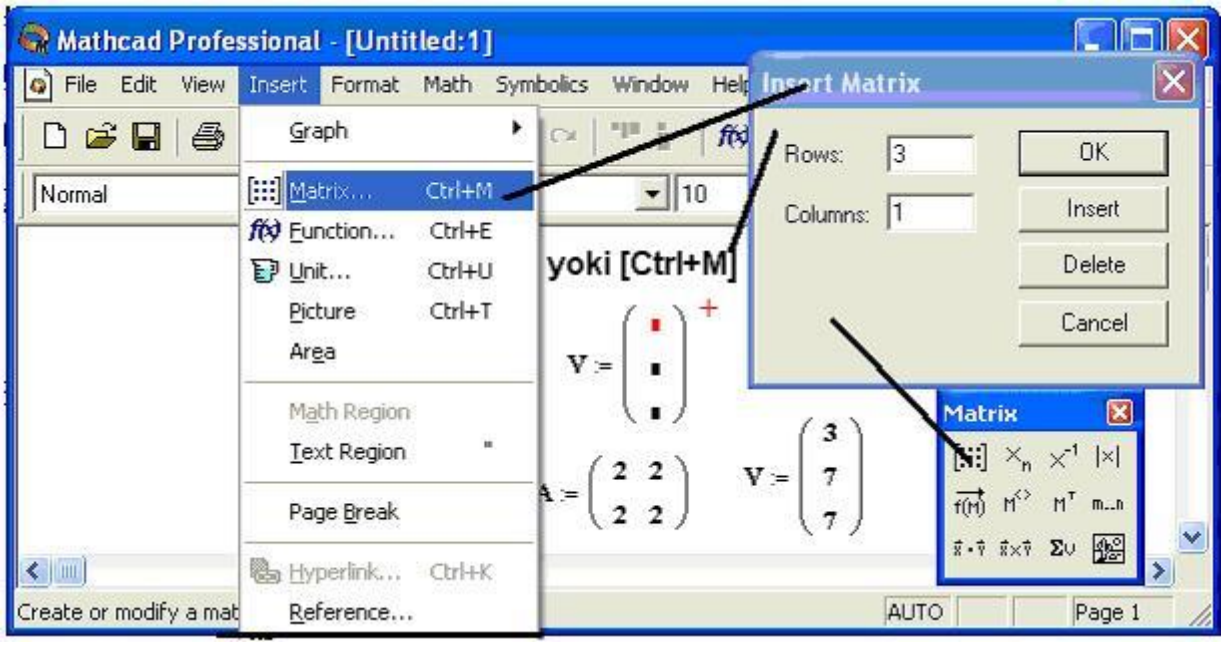
Maqsad: Talabalarni Mathcad paketida vektorlar va matritsalar ustida turli hil amallar ish ustida olib borish.

Nazariy qism

O‘zgaruvchilar ham skalyar sonlar kabi massivga ega. Massivni aniqlash ham o‘zgaruvchilarga skalyar qiymatlarni berganimizdek avval o‘zgaruvchining nomi yoziladi va : qo‘yiladi keyin massiv kiritiladi (vektor yoki matritsa). Masalan 3 elementli v vektorni aniqlash uchun quyidagi ishlar bajariladi.

bo‘sh satrda v vektorni kiritamiz V:=● ko‘rinishda.

INSERT bo‘limidan Matrix… ni tanlaymiz yoki [Ctrl+M] tugmasini bosamiz yoki Matematik belgilar panelidan matritsa belgisini tanlaymiz natijada muloqot oynasi hosil bo‘ladi. Satr va ustun elementlar sonini kiritib OK tugmasini bosib vektor yoki matritsa hosil qilinadi.

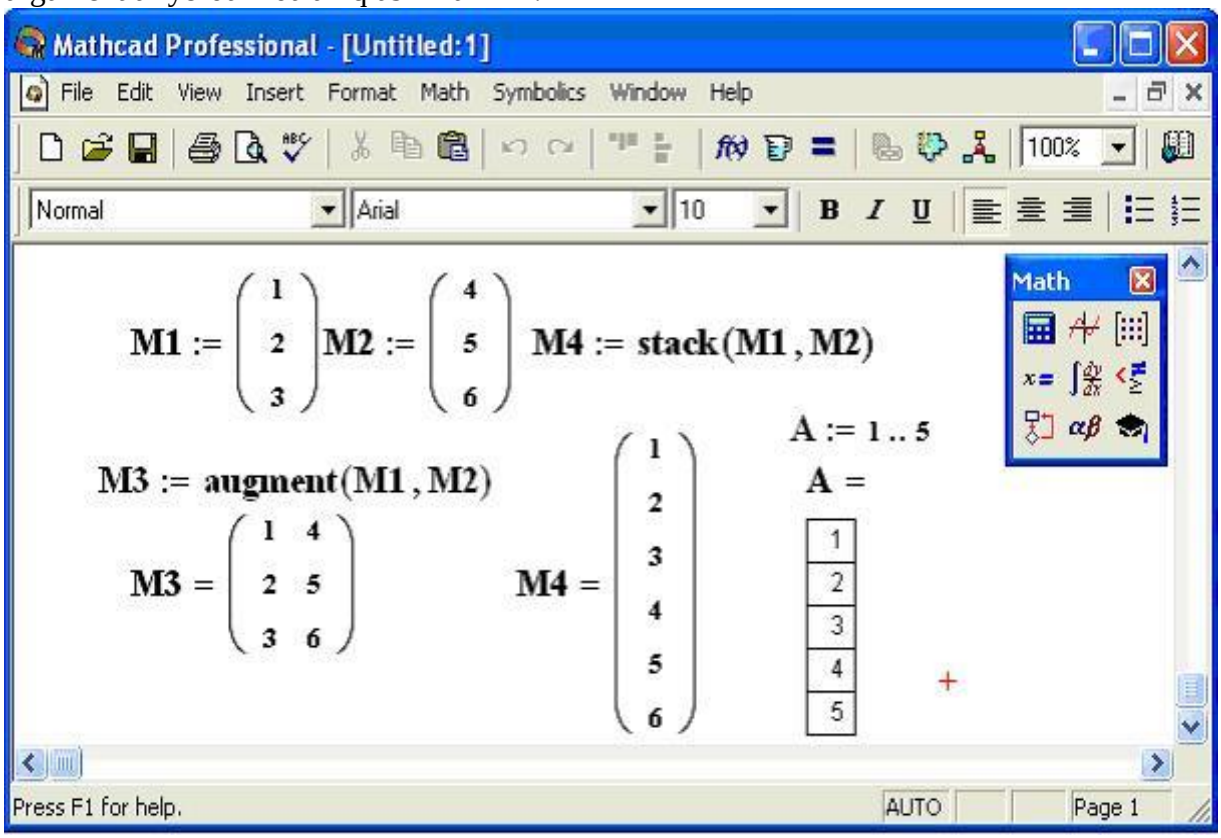


Rasm 6.1.

Massivni hosil qilganimizdan keyin uning elementlarini Tab tugmasi orqali to‘ldirib chiqamiz.

Rasm 6.2.

Massiv elementlariga murojaat qilish uchun quyi chegarani ishlatamiz, uning alohida ustunlariga murojaat qilish uchun yuqori chegaradan foydalanamiz. Quyi chegara [bilan yuqori chegara [Ctrl+6] tugmalari yordamida chiqariladi. Masalan yuqoridagi misolda $V_0=3$, $A_{1,1}=2$, $A^1=\begin{pmatrix}2\\2\end{pmatrix}$ ga teng bo‘ladi. Ba’zi massiv elementlariga qiymat berilmasligi ham mumkin. Masalan X ga qiymat bermasdan X_3 ga qiymat berilsa X_0, X_1, X_2 lar 0 qiymat qabul qiladi. Agar massivlarni e’lon qilishdan oldin ORIGIN≡0 deb yozsak massiv elementlarini tartiblashni 0 dan boshlaydi. Agar ORIGIN≡1 deb yozsak massiv elementlarini tartiblashni 1 dan boshlaydi. Massiv elementlari 100 dan ortiq bo‘lsa uni 1- rasmda keltirilganidek aniqlab bo‘lmaydi. Buning uchun “ argument ” yoki “stack” funksiyalaridan foydalanish mumkin yoki diskret argumentlar yordamida aniqlash mumkin.



Rasm 6.3.

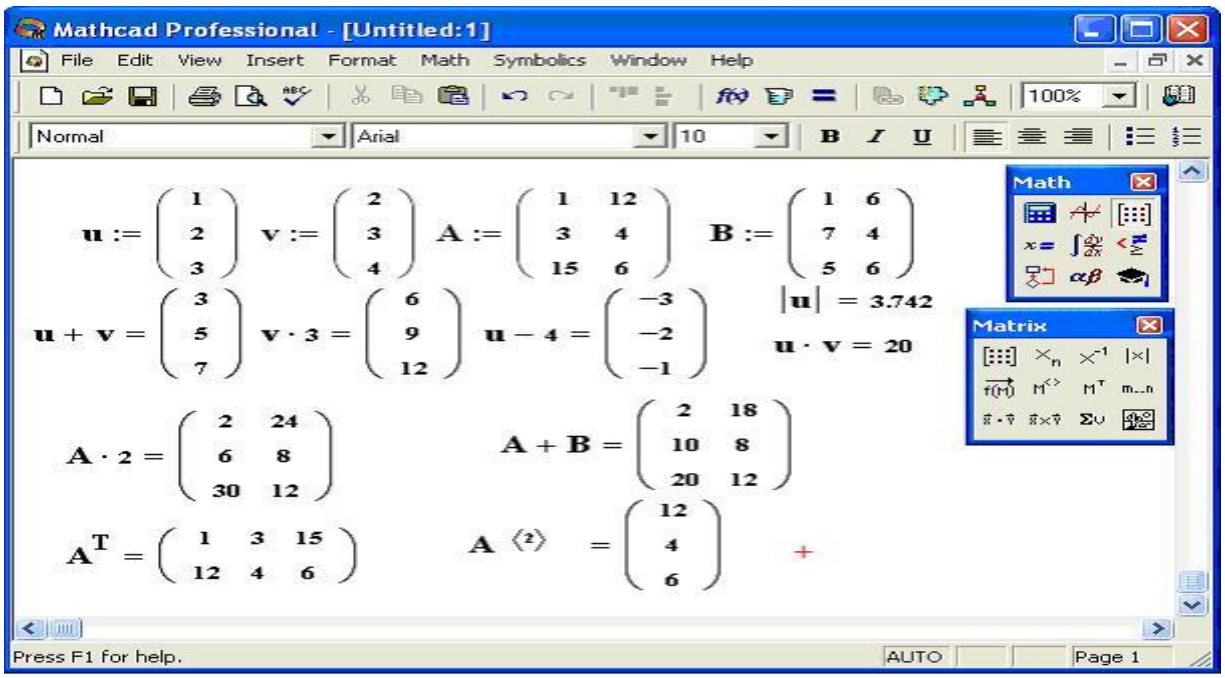
Mathcad tizimida Vektor va Matritsaviy operatorlar

Ba’zi Mathcad dagi operatorlar matritsa va vektorlarni o‘zgartirish uchun muhimdir. Bu operatorlarning ko‘pi simvollardan iborat va jadval ko‘rinishda keltiramiz

Amal	Ko‘rinishi	Tugma	Ma’nosi
Matritsani skalyar songa ko‘paytirish	A•n	*	A ning har bir elementi n ga ko‘paytiriladi
Skalyar ko‘paytma	u•v	*	u va v ning uzunligi teng
Matritsaviy ko‘paytma	A•B	*	A ustunlar soni B qatorlar soniga teng
Matritsani vektorga ko‘paytirish	A•v	*	A ustunlar soni v ning satrlar soniga teng bo‘lishi kerak
Matritsani songa bo‘lish	$\frac{A}{n}$	/	Har bir massiv elementi n ga bo‘linadi
Vektor va matritsani yig‘indisi va ayirmasi	A+B, u+v A-B, u-v	+	Massivlar bir xil satr va bir xil ustunga ega bo‘lishi kerak
Skalyar yig‘indi	A+n	+	A ning har bir qiymatiga n qo‘shiladi
Skalyar ayirma	A-n	-	A ning har bir qiymatidan n ayiriladi
Ishorani almashtirish	-A	-	A ni –1 ga ko‘paytiradi
Matritsa darajasi	M^n	^	n-darajali kvadrat matritsa M^{-1} , M ga teskari matritsa
Vektor uzunligi	|v|	Shift+\	
Determinant	|M|	Shift +\	
Transponirlash	A^T	Ctrl+1	Satr elementlarini ustun elementlariga almashtiradi
Vektor ko‘paytma	Uxv	Ctrl+8	u va v lar uchun ko‘paytmani hisoblaydi.
Kompleks	$\overline{A}$	“	A ning mavhum qismini belgisini almashtiradi
Yuqori daraja	$A^{<n>}$	Ctrl+6	Matritsaning n – ustuni
Vektorizatsiya	$\vec{A}$	Ctrl+-	
Quyi indeks	$A_{n,m}$	[	
Elementlar yigindisi	$\sum v$	Ctrl+4	

Yuqoridagi jadvalda keltirilgan o‘zgaruvchilarda.

1.A va B – matritsalar.
2.u va v - vektorlar.
3.M- kvadrat matritsa.
4.u_i va v_i -u va v vektorning elementlari.
5.m va n –butun sonlar.



Rasm 6.4.

MathCAD o‘zida algebra va chiziqli algebra uchun funksiyalarni saqlaydi. Bu funksiyalar vektorlar va matritsalarni ishlatish uchun tayinlangan. Keyingi jadvalda vektorli va matritsali funksiyalar keltirilgan.

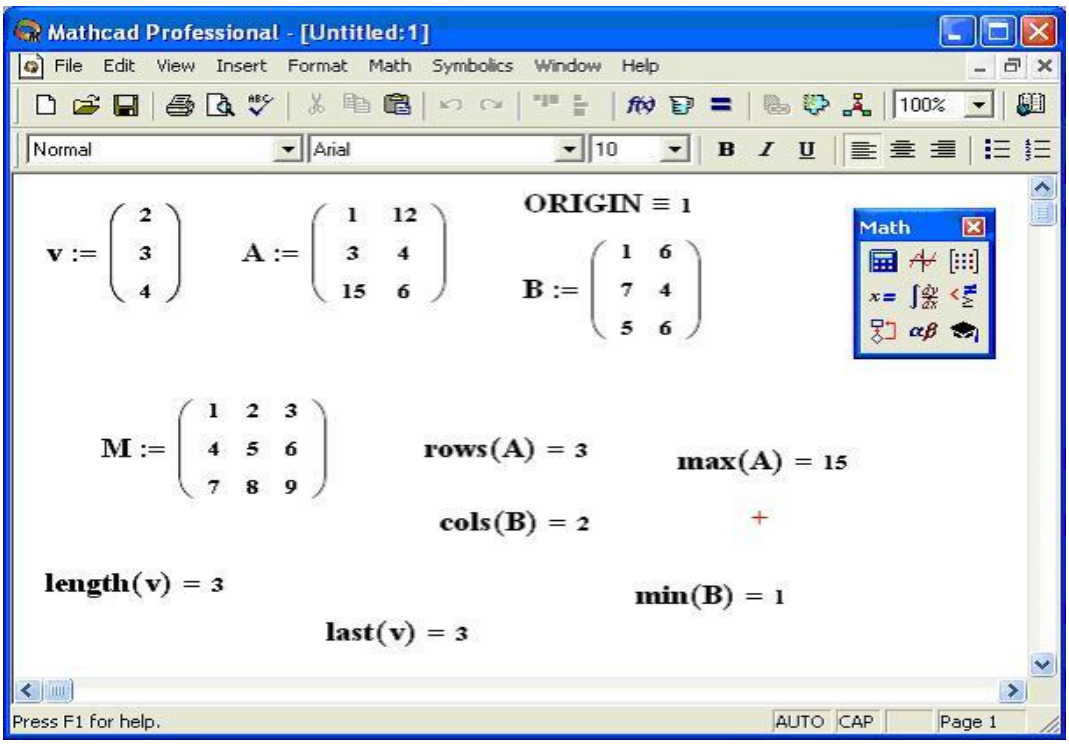
Bunda : A va B –massivlar. V- vektor.

M va N – kvadrat matritsa.

z- skalyar son

m,n,i,j-butun sonlar.

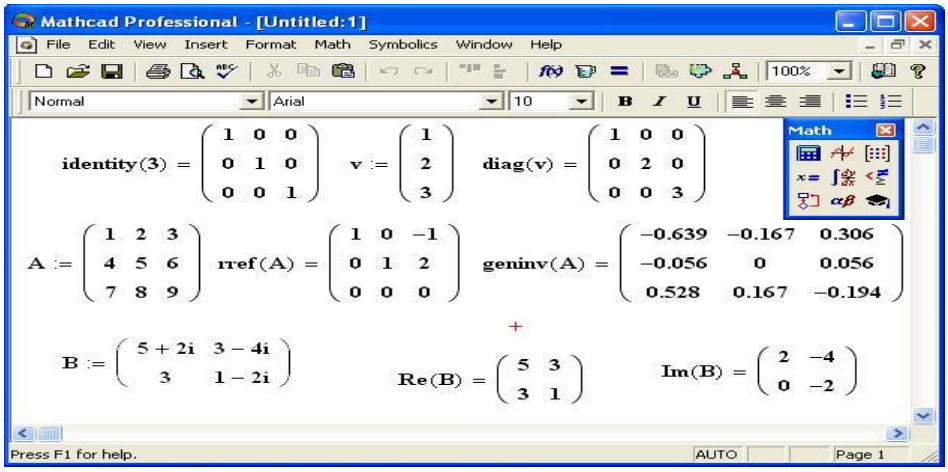
Funksiya nomi	**Hosil bo‘ladi**
rows(A)	A massivning satrlar soni
cols(A)	A massivning ustunlar soni
length(V)	V vektorning elementlar soni
last(V)	V vektor elementining oxirgi indeksi
max(A)	A massivning eng katta elementi
min(A)	A massivning eng kichik elementi



Rasm 6.5.

Matritsali funksiyalar.

Funksiya nomi	Hosil bo‘ladi
identity(n)	Nxn birlik matritsa
Re(A)	A matritsa elementining aniq qismiga tegishli massiv
Im(A)	A matritsaning mavhum qismiga tegishli massiv
diag(v)	V ni matritsa diagonalida joylashtiradi
geninv(A)	A- mxn matritsa m≥n
rref(A)	A matritsani bosqichli formasi



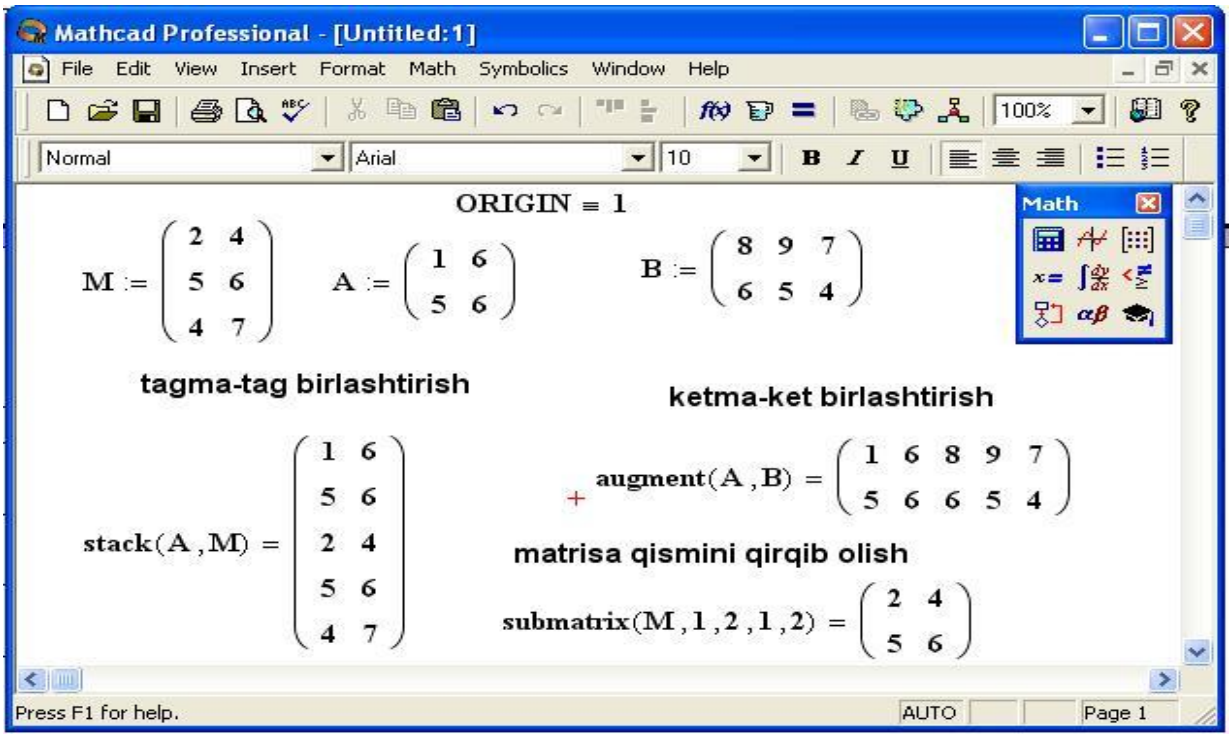
Rasm 6.6.

Matritsani xarakteristikasi.

Funksiya nomi	Hosil bo‘ladi
tr(M)	M-kvadrat matritsa diagonal elementlari yig‘indisi
tr(M)	T-massiv elementlari o‘rta arifmetigi.
mean(T)	A matritsaning rangi
rank(A)	M matritsaning L_1 normasi
norm1(M)	M matritsaning L_2 normasi
norm2(M)	M matritsaning Yevklid normasi
norme(M)	M matritsaning teng o‘lchovli normasi
normi(M)	M matritsa shartli soni L_1 normaga asosli
cond1(M)	M matritsa shartli soni L_2 normaga asosli
cond2(M)	M matritsa shartli soni Yevklid normaga asosli
conde(M)	M matritsa shartli soni teng o‘lchovli normaga asosli
cond(iM)	

Yangi matritsani formatlash.

Funksiya nomi	Hosil bo‘ladi
augment(A,B)	A va B massivni ketma-ket joylashtiradi. A va B ning satr elementlari teng bo‘lishi kerak.
stack(A,B)	A va B massivni tagma-tag joylashtiradi. A va B ning ustun elementlari teng bo‘lishi kerak.
Submatrix(A,m,n,i,j)	A-matritsaning m…n satr va i…j ustun elementlaridan iborat.



Rasm 6.7.

Massivlardan o‘zgaruvchi va funksiyalarni e’lon qilishda ham ishlatish mumkin.

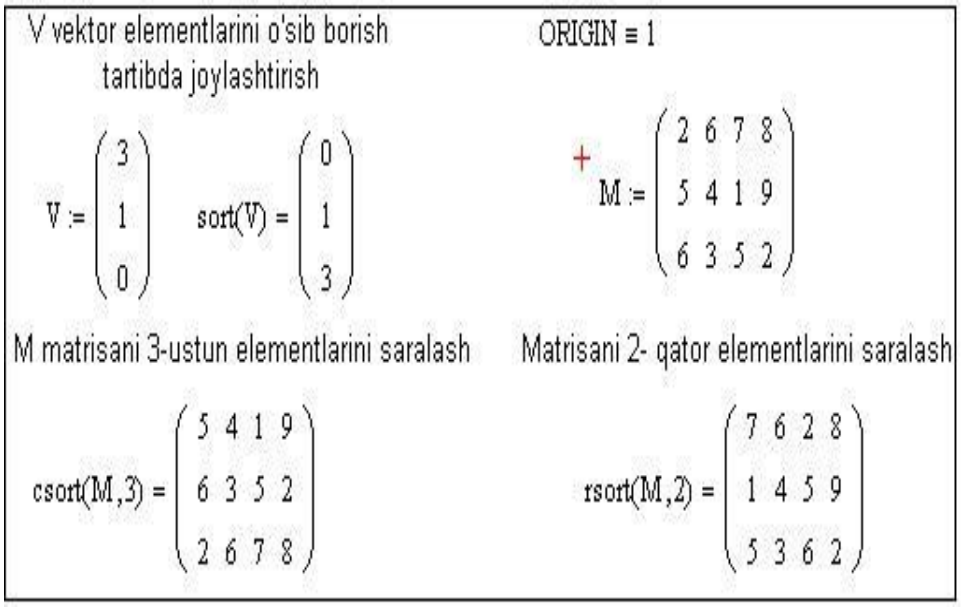
Masalan: $\begin{pmatrix} a \\ b \\ c \end{pmatrix} := \begin{pmatrix} 5 \\ 6 \\ 7 \end{pmatrix}$ bu yerda a=5 ga b=6 ga c=7 ga teng.

$$F(x) := \begin{pmatrix} x^2 & x \\ \sqrt{x} & -x \end{pmatrix} \qquad F(4) := \begin{pmatrix} 16 & 4 \\ 2 & -4 \end{pmatrix}$$

$F(4)_{2,2}$=-4 $\qquad F(4)^{<2>} = \begin{pmatrix} 4 \\ -4 \end{pmatrix}$

Matritsa va vektor elementlarini saralash.

sort(V)	V- vektor elementlarini o‘sib borish tartibida joylashtirish.
revarse(V)	V vektor elementlarini kamayib borish tartibida joylashtirish.
csort(M,n)	M-matritsa n-qator elementlarini saralsh
rsort(M,n)	M-matritsa n- ustun elementlarini saralash



Rasm 6.8.

7-AMALIYOT ISHI
MATHCADDA VA ELEKTRON JADVALLARDA TENGLAMALAR YECHISH.

Maqsad: Mathcad tizimida tenglama va tengsizliklarni ishlash haqida tushunchaga ega bo‘lish. Matematik tenglama va tengsizliklarni hisoblash bo‘yicha masalalar yechishni o‘rganish.

Nazariy qism

Mathcad tizimi va unda ishlash texnologiyasi.

Matematik paketlar, ayniqsa Mathcad –mashhur paket bo‘lib, ilmiy – texnikaviy soha mutaxassislariga dasturlashning nozik elementlariga e’tibor berilmasdan (masalan:fortran, C, paskal, BASIC va boshqalar kabi) kompyuterda matematik modellashtirishni amalga oshirishga katta yordam beradi.

Mathcad 1986-yilda Massachueset texnika unversitetida olim Allen Razdov tomonidan yaratilgan. Hozirgi kunda Mathcad dasturini ko‘plab versiyalari (variantlari) yaratilgan bolib, ulardan oxirgisi Mathcad s 1.0 po 4.xx, Mathcad 1.0 dan 15 versiyalarigacha ishlab chiqarilgan. Tabiiyki, har bir variant uzidan oldingisidan foydalanish uchun qulayligi va boy imkoniyatlari bilan farq qiladi.

Quyida Mathcad matematik dasturlash muhitida ishlashning yaqqol ajralib turadigan imkoniyatlarini sanab o‘tmoqchimiz:

- **Mathcad** muhitida matematik ifoda, qabul qilingan ko‘rinishda ifodalanadi. Masalan, daraja yuqorida, indeks pastda, integralning yuqori va quyi chegaralari esa an’anaviy joyida turadi.
- **Mathcad** muhitida “dasturlashni” tuzish va ularning bajarilish jarayoni parallel kechadi. Foydalanuvchi **Mathcad** – hujjatida yangi ifoda kiritar ekan, uning qiymatini hisoblash va ifodani kiritishda yo‘l qoyilgan yashirin xatoliklarni grafigini ko‘rish imkoniyati ham mavjud.
- **Mathcad** paketi yetarli darajada qudratli matematik apparat bilan qurollanganki, ular orqali tashqi pratseduralarni chaqirmasdan turib paydo bo‘ladigan muammolarni hal qilishimiz mumkin.

Mathcadga xos bo‘lgan ayrim hisoblovchi qurilmalarni sanab o‘tmoqchimiz:

- Chiziqli va chiziqli bo‘lmagan algebraik tenglama va sistemalarni yechish;
- Oddiy differensial tenglama va sistemalarni (Koshi masalasi va chegaraviy masala) yechish;
- Xususiy hosilali differensial tenglamalarni yechish;
- Berilganlarni statik qayta ishlov berish (interpolyatsiya, ekstrapolyatsiya, approksimatsiya va ko‘pgina boshqa amallar);
- Vektor va matritsalar bilan ishlash (Chiziqli algebra va boshqalar);
- Funksional bog’liqlikning maksimum va minimumini izlash.

Mathcad paketi matematik va fizik-kimyoviy formulalarga, hamda o‘zgarmaslarga asoslangan yordamchi qo‘llanmalar bilan boyitilgan.

Foydalanuvchi o‘z oldiga qoyilgan masalani yechish bilan cheklanibgina qolmay, fizikaviy maslalarni yechishda o‘lchovni hisobga olish imkoniyatiga ega. Bunda foydalanuvchi birliklar sistemasini ham tanlashi mumkin.

Matematik ifodalarni qurish va hisoblash.

Boshlang`ich holatda ekranda kursor krestik ko`rinishda bo`ladi. Ifodani kiritishda u kiritilayotgan ifodani egallab olgan ko`k burchakli holatga o`tadi. Mathcadning har qanday operatorini kiritishni uchta usulda bajarish mumkin:

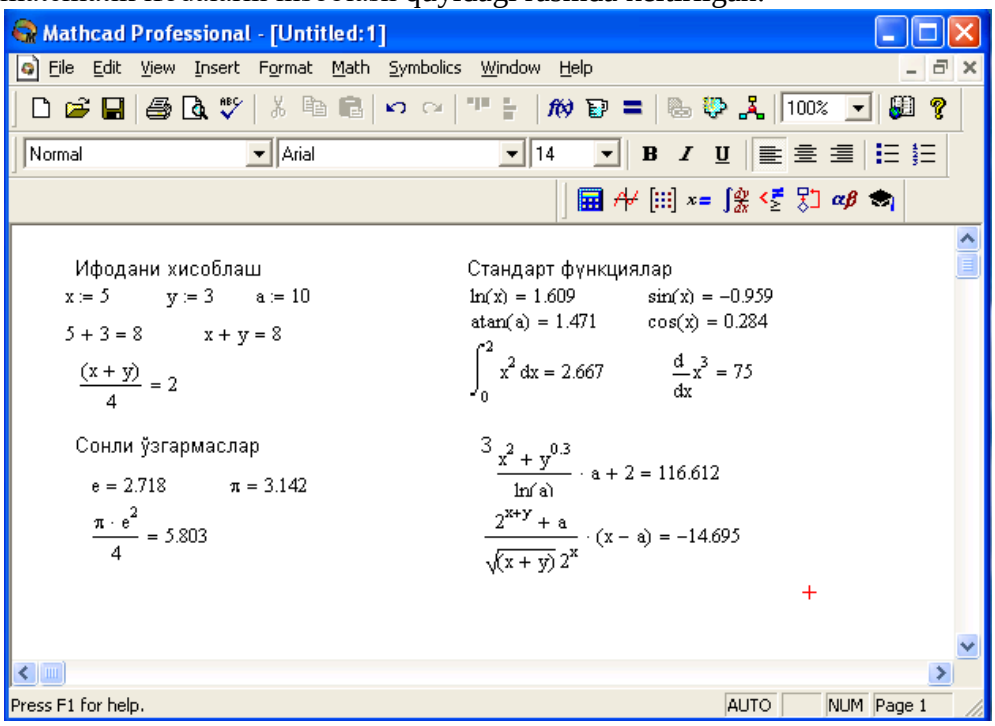
- menyu buyrug`idan foydalanib;
- klaviatura tugmalaridan foydalanib;
- matematik paneldan foydalanib.

O`zgauvchilarga qiymat berish uchun yuborish operatori ":=" ishlatiladi. Hisoblashlarni amalga oshirish uchun oldin formuladagi o`zgaruvchi qiymatlari kiritiladi, keyin matematik ifoda yozilib tenglik "=" belgisi kiritiladi, natijada ifoda qiymati hosil bo`ladi.

Oddiy va matematik ifodalarni tahrirlashda menyu standart buyruqlaridan foydalaniladi. Tahrirlashda klaviaturadan ham foydalanish mumkin, masalan

- qirqib olish – Ctrl+x;
- nusxa olish – Ctrl+c;
- qo`yish – Ctrl+v;
- bajarishni bekor qilish – Ctrl+z.

Oddiy matematik ifodalarni hisoblash quyidagi rasmda keltirilgan:



Rasm 7.1.

Diskret o`zgaruvchilar va sonlarni formatlash.

Mathcadda diskret o`zgaruvchilar deganda sikl operatorini tushunish kerak. Bunday o`zgaruvchilar ma'lum qadam bilan o`suvchi yoki kamayuvchi sonlarni ketma-ket qabul qiladi. Masalan:

x:=0..5. Bu shuni bildiradiki bu o`zgaruvchi qiymati qator bir necha qiymatlardir, ya'ni x=0,1,2,3,4,5.

x:=1,1.1..5. Bunda 1 – birinchi sonni, 1,1 – ikkinchi sonni, 5 - oxirgi sonni bildiradi.

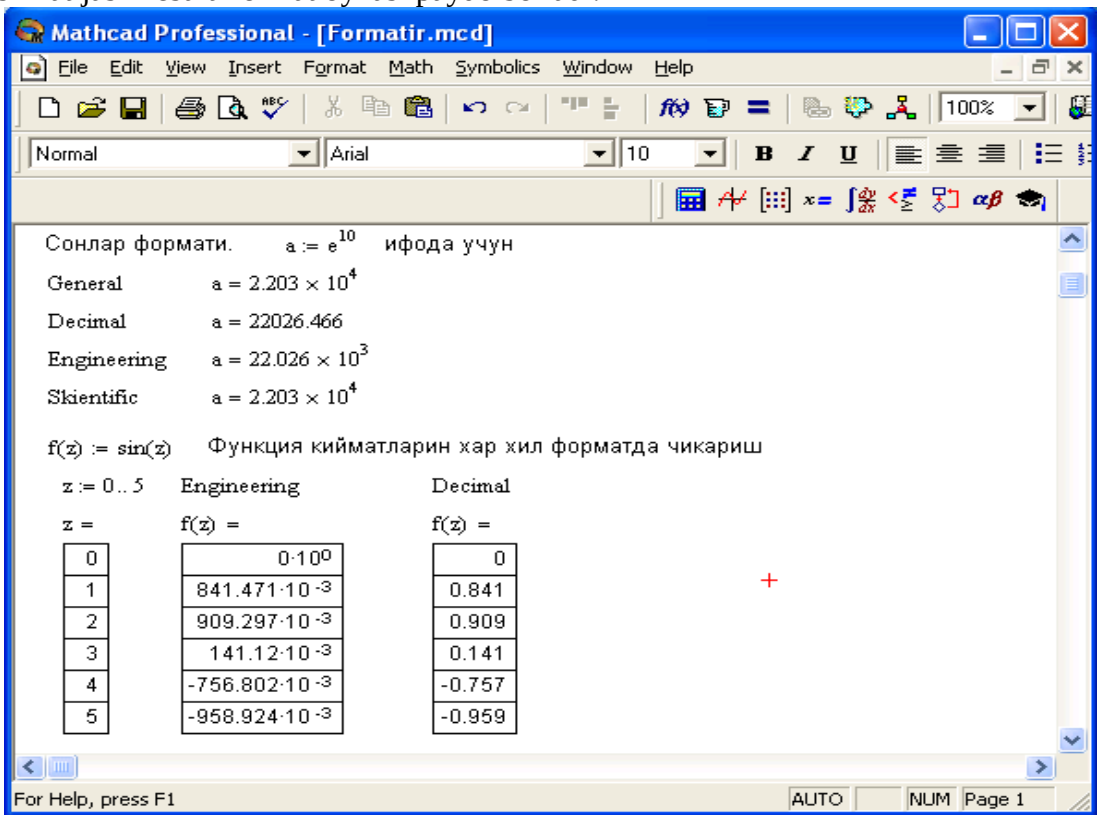
x:=A,A+B..B. Bunda A – birinchi, A+B – ikkinchi, B - oxirgi sonni bildiradi.

Izoh! O`zgaruvchi diapazonini ko`rsatishda ikki nuqta o`rniga klaviaturadan (;) nuqta vergul kiritiladi yoki Matrix (Matritsa) panelidan Range Variable (Diskret o`zgaruvchi) tugmasi bosiladi. Hisoblangan qiymatni chiqarish uchun esa o`zgaruvchi va tenglik belgisini kiritish

kifoY. Natijada o`zgaruvchi qiymati ketma-ket jadvalda chiqadi. Masalan, x:=0..5 deb yozib, keyin x= kiritish kerak.

Foydalanuvchi funksiyaning uning argumentiga mos qiymatlarini hisoblab chiqarish va bu qiymatlarni jadval yoki grafik ko`rinishda tasvirlashda diskret o`zgaruvchilardan foydalanish qulaylikni keltiradi. Masalan, f(x)=sin(x)·Cos(x) funksiya qiymatlarini x ning 0 dan 5 gacha bo`lgan qiymatlarida hisoblash kerak bo`lsa, u holda quyidagi kiritishni amalga oshirish kerak: f(x)=sin(x)·Cos(x) x:=0..5 f(x)=*javob.*

Sonlarni formatlash. Odatda Mathcad 20 belgi aniqligigacha matematik ifodalarni hisoblaydi. Hisoblash natijalarini kerakli formatga o`zgartirish uchun sichqoncha ko`rsatgichini sonli hisob chiqadigan joyga keltirib, ikki marta tez-tez bosish kerak. Natijada sonlarni formatlash natijasi Result Format oynasi paydo bo`ladi.



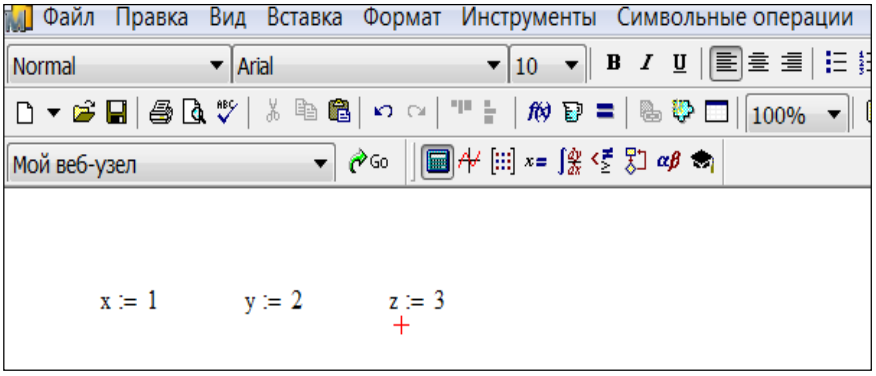
Rasm 7.2.

Mathcad tizimida ishlash. Sodda hisoblashlar bajarish boyicha topshiriqlar.

9) x,y,z o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

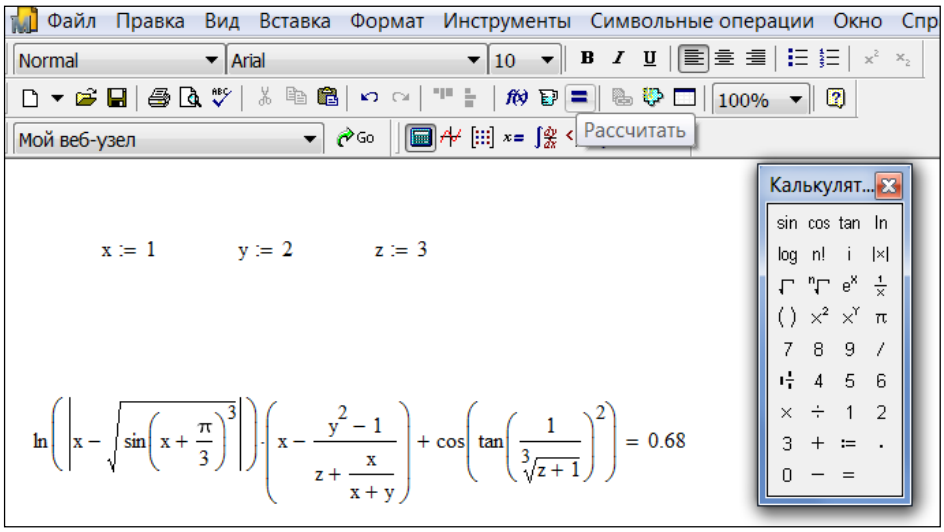
$$\ln\left|\left(x-\sqrt{\sin^3\left(x+\frac{\pi}{3}\right)}\right)\right|\left[x-\frac{y^2-1}{z+\frac{x}{x+y}}\right]+\cos\left[tg^2\left[\frac{1}{\sqrt[3]{z+1}}\right]\right]$$

Dastlab o‘zgaruvchilarning qiymatini kiritamiz:



Rasm 7.3.

So‘ngra **Калькулятор** paketidan foydalanib, ifodani kiritamiz; (=) (tenglik) belgisini bosib,natijaga erishamiz



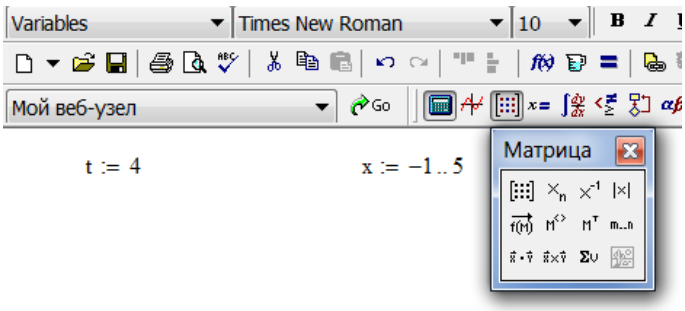
Rasm 7.4.

10) [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling:

11)

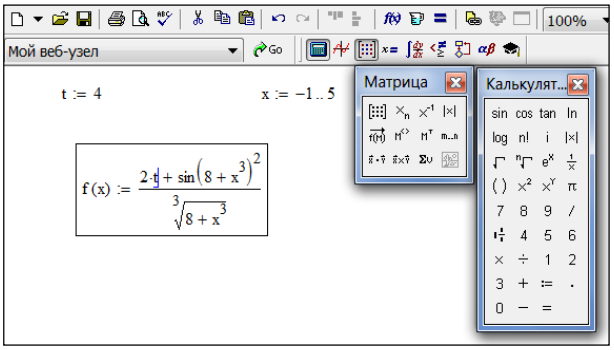
$$d = \frac{2m + \sin^2(8 + x^3)}{\sqrt[3]{8 + x^3}}, m = 4, a = -1, b = 5, h = 1.$$

Dastlab o‘zgaruvchilarni kiritamiz; [-1,5] oraliqni kiritish uchun **Матрица** paketining (**m..n)** amalidan yoki klaviaturadagi (**J)** klavishidan foydalanamiz.



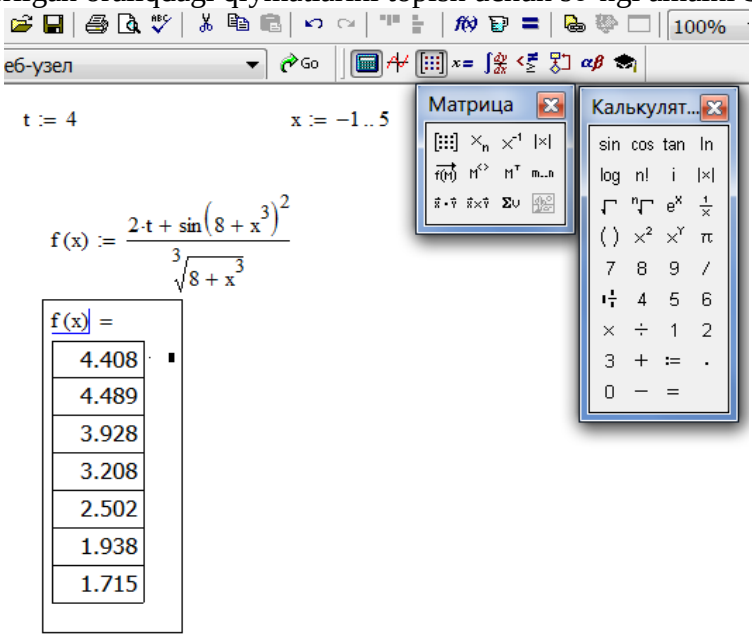
Rasm 7.5.

So‘ngara **Калькулятор** paketidan foydalanib funksiyani quyidagicha kiritamiz:



Rasm 7.6.

Funksiyaning berilgan oraliqdagi qiymatlarini topish uchun so‘ngi amalni bajaramiz:



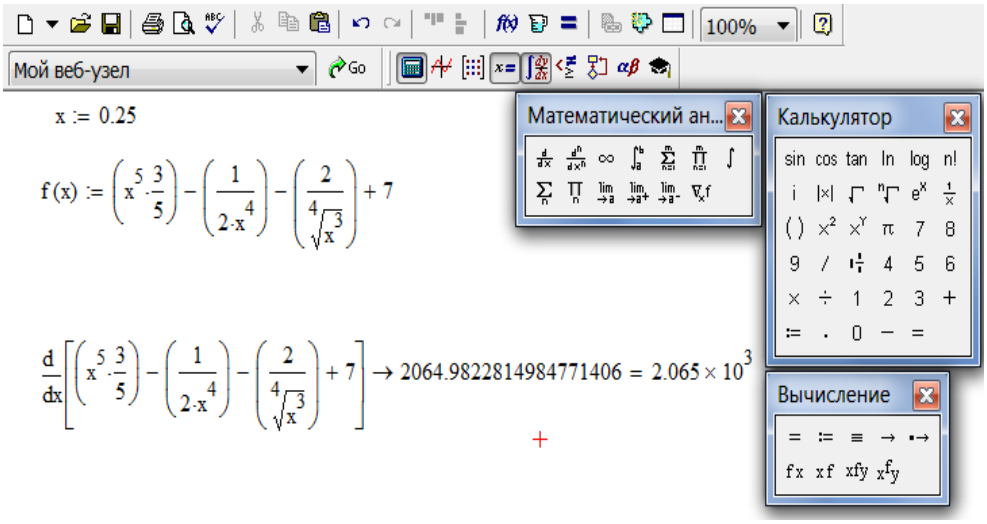
Rasm 7.7.

12) x=0.25 Funksiya hosilasini berilgan qiymatda hisoblang:

$$f(x) := \left(x^{5}\cdot\frac{3}{5}\right) - \left(\frac{1}{2\cdot x^{4}}\right) - \left(\frac{2}{\sqrt[4]{x^{3}}}\right) + 7$$

Ushbu fuksiyani xosilasini hisoblash uchun **Математические** panelidagi **Вычисление Математические** va **Калькулятор** paketlari kerak bo‘ladi.

Paketlar yordamida funksyani quyidagi ko‘rinishga keltiramiz va natijaga erishamiz:

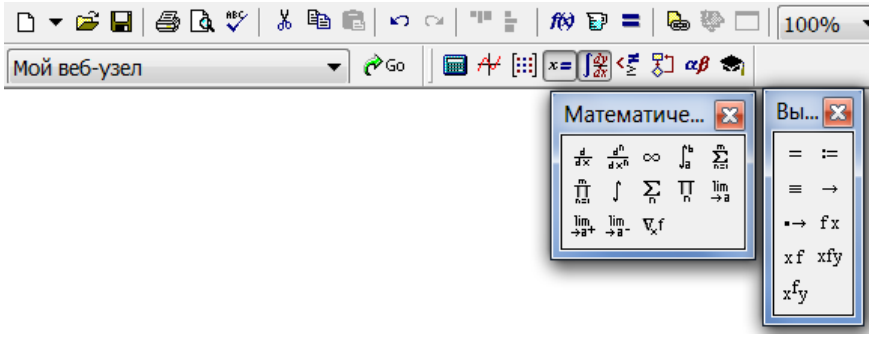


Rasm 7.8.

13) Quyidagi limitni toping:

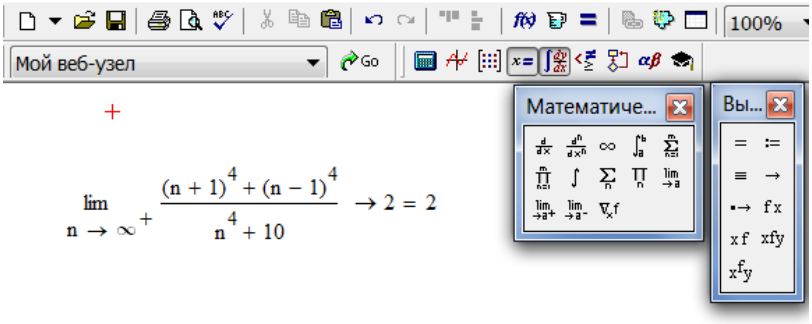
$$\lim_{n\to\infty}\frac{(n+1)^4+(n-1)^4}{n^4+10}$$

Ushbu limitni topish uchun bizga **Математические** panelidagi **Калькулятор** va **Вычисление** paketlari kerak bo‘ladi:



Rasm 7.9.

Dastlab ifodani kiritamiz va natijaga erishish uchun **Вычисление** paketidan foydalanamiz:

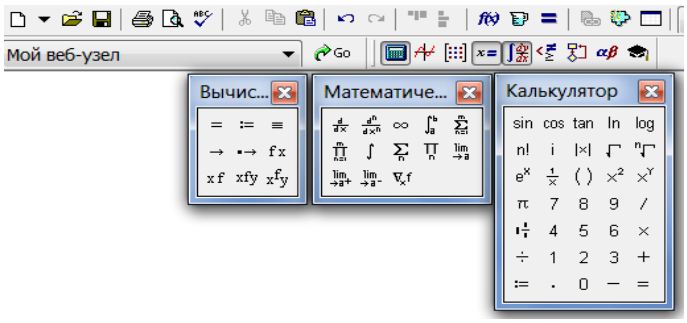


Rasm 7.10.

14) Aniq integralni hisoblang va natijani solishtiring:

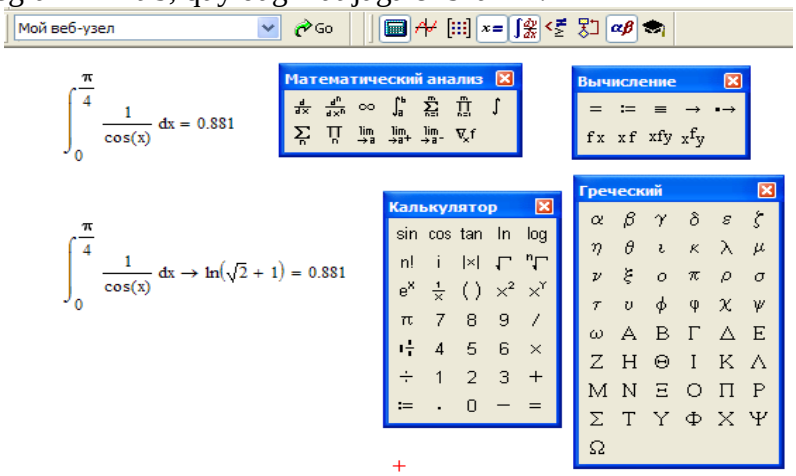
$$\int_0^{\frac{\pi}{4}} \frac{1}{\cos(x)}\,dx \to \ln(\sqrt{2}+1) = 0.881 \qquad \int_1^4 e^x\left(1-\frac{e^{-x}}{x^2}\right)dx = 51.13$$

Ushbu aniq integrallarni hisoblash uchun **Математические** panelidagi **Калькулятор, Вычисление** va **Математический анализ** paketlaridan foydalanamiz.



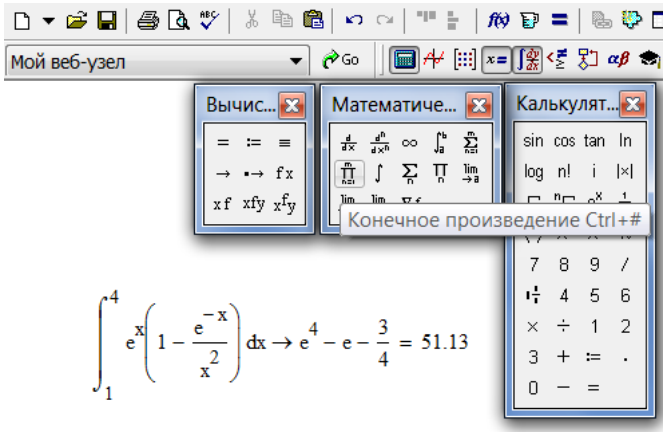
Rasm 7.11.

So‘ng aniq integralni kiritib, quyidagi natijaga erishamiz:



Rasm 7.12.

Grek alifbosi harflarini ishlatish uchun Γrecheskiy paketlaridan ham foydalandik. 2-aniq integralni shunday tartibda kiritamiz va quyidagi natijaga erishamiz:

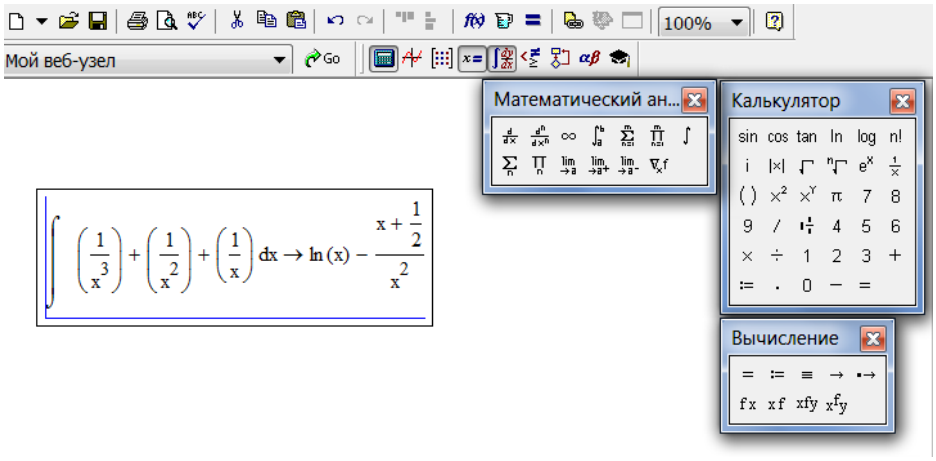


Rasm 7.13.

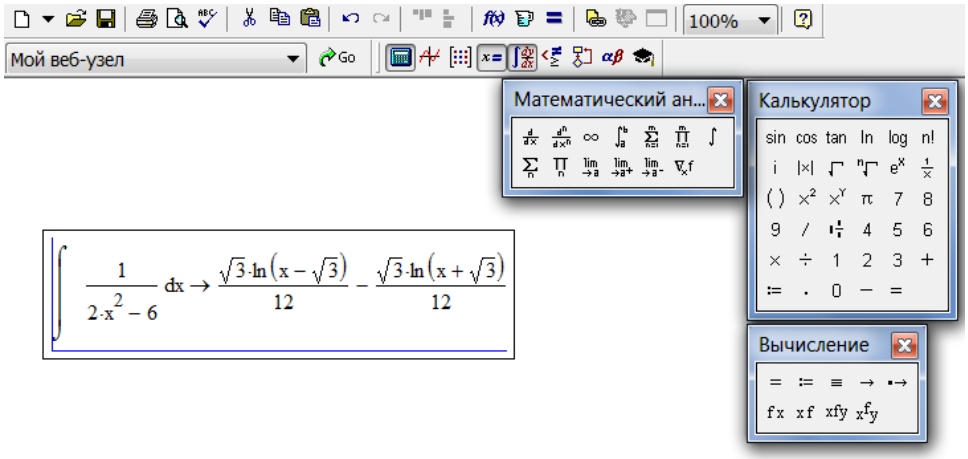
15) Aniqmas integralni hisoblang va natijani solishtiring:

$$\int\left(\frac{1}{x^3}+\frac{1}{x^2}+\frac{1}{x}\right)dx \to \frac{-1}{\left(2x^2\right)}-\frac{1}{x}+\ln(x) \qquad \int\frac{1}{2x^2-6}dx \to \frac{-1}{6}\cdot\sqrt{3}\cdot a\tanh\left(\frac{1}{3}\cdot x\cdot\sqrt{3}\right)$$

Ushbu aniqmas integrallarni hisoblash uchun **Математические** panelidagi **Калькулятор, Вычисление** va **Математический анализ** paketlaridan foydalanamiz. So‘ng aniqmas integrallarni kiritib, quyidagi natijalarga ega bo‘lamiz:



Rasm 7.14.

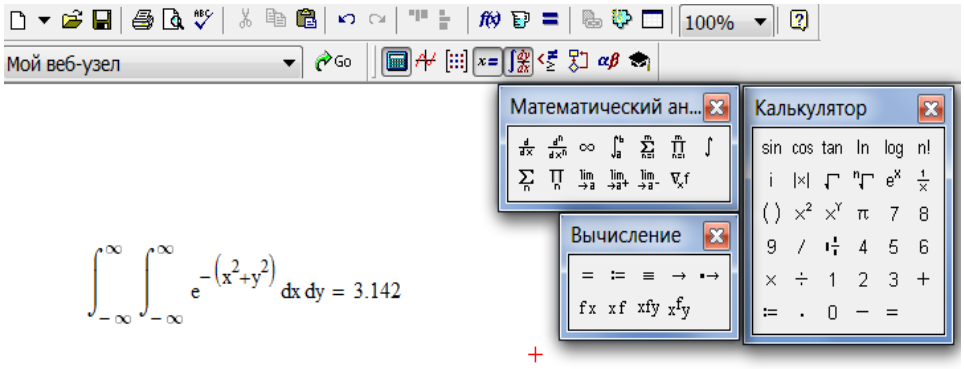


Rasm 7.15.

16) Karrali integralni hisoblang va natijani solishtiring:

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-\left(x^2+y^2\right)}\,dx\,dy = 3.142$$

Ushbu karrali integrallarni hisoblash uchun **Математические** panelidagi **Калькулятор, Вычисление** va **Математический анализ** paketlaridan foydalanamiz. Ishchi sohaga karrali integralni kiritib, quyidagi natijani hosil qilamiz:



Rasm 7.16.

8-AMALIYOT ISHI
MATHCAD PAKETIDA VA ELEKTRON JADVALLARDA LIMITLAR, DIFFERENSIAL TENGLAMALAR, INTEGRALLAR TURLI XIL USULLAR BILAN HISOBLASH.

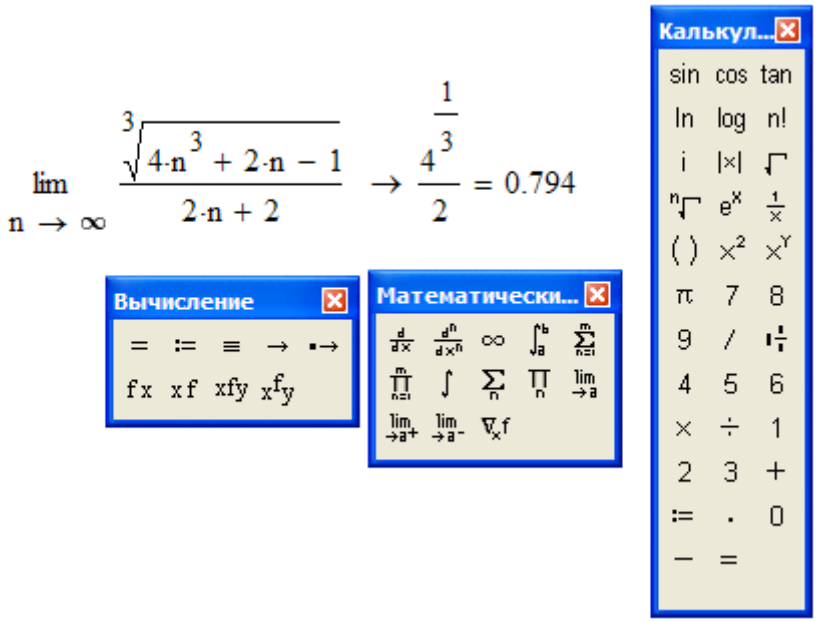
Maqsad: Talabalarni limitlar, differensial tenglamalar, integrallar turli xil usullar bilan hisoblashni ishlashga o‘rgatish.

Nazariy qism

Limitlarni hisoblash.

Mathcadda limitlarni hisoblashning uchta operatori bor.

1.**Математические** panelidan **Калькулятор** va **Математический анализ** tugmalari bosiladi.



Rasm 8.1.

1. **Математические** panelidan **Математический анализ** tugmasi basilsa, **Математический анализ** paneli ochiladi. U yerning pastki qismida limitlarni hisoblash operatorlarini kiritish uchun uchta tugmacha mavjud. Ularning birini bosish kerak.

2.lim so`zining o`ng tomonidagi kiritish joyiga ifoda kiritiladi.

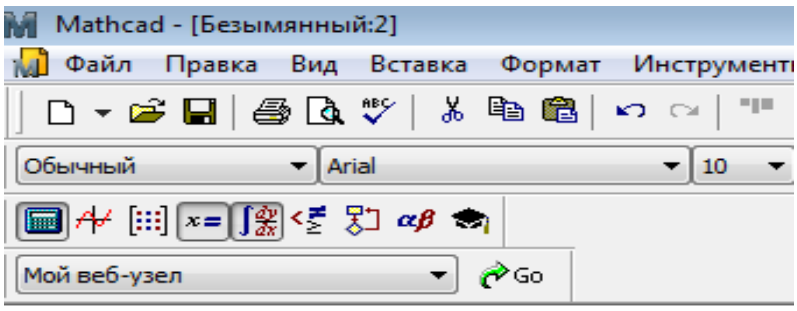
3.lim so`zining ostki qismiga o`zgaruvchi nomi va uning intiladigan qiymati kiritiladi.

Simvolli yechish.

Tenglamaning simvolli yechimini topish uchun quyidagi ishlar ketma-ketligini bajarish kerak:

1.Yechiladigan tenglamani kiritish va tenglama yechimi bo`lgan o`zgaruvchini kursorning ko`k burchagida ajratish.

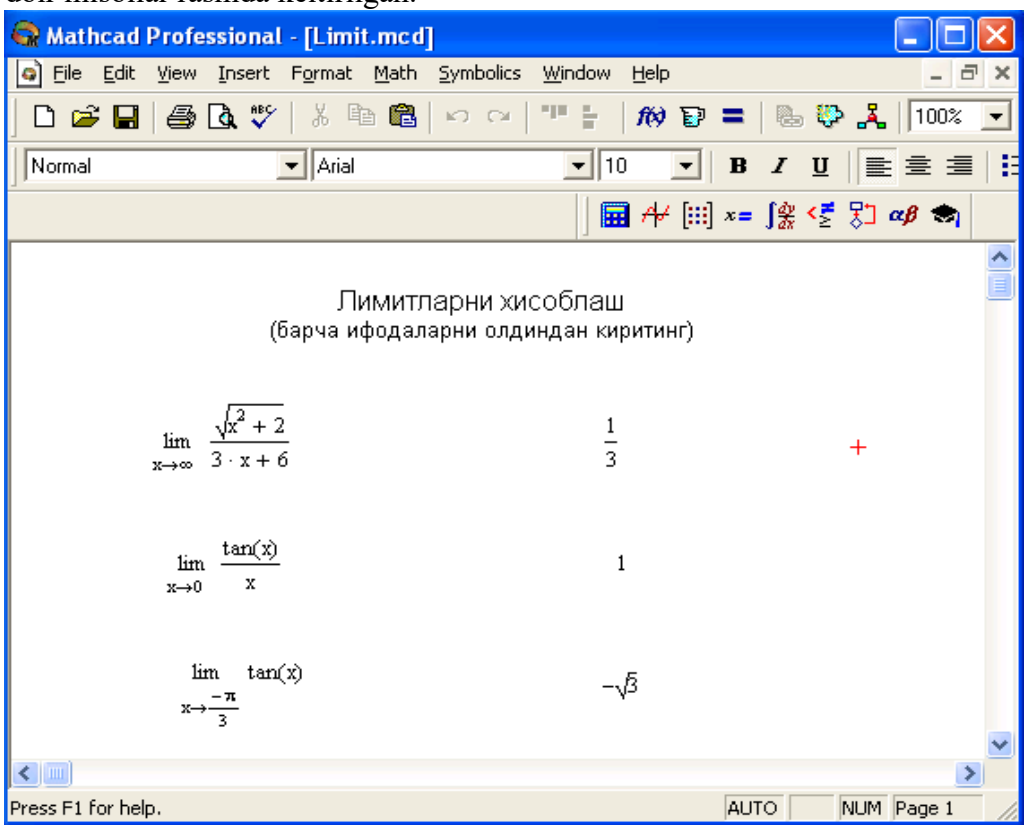
2.**Символьные операции** menyudan — **Переменная** — **Решить** (Belrili amallar — o`zgaruvchi — yechish) buyrug`ini tanlash. Tenglamani yechish rasmda keltirilgan.



$$2 \cdot h^2 + h - bb$$

$$\begin{pmatrix} \frac{\sqrt{8 \cdot bb + 1}}{4} - \frac{1}{4} \\ -\frac{\sqrt{8 \cdot bb + 1}}{4} - \frac{1}{4} \end{pmatrix}$$

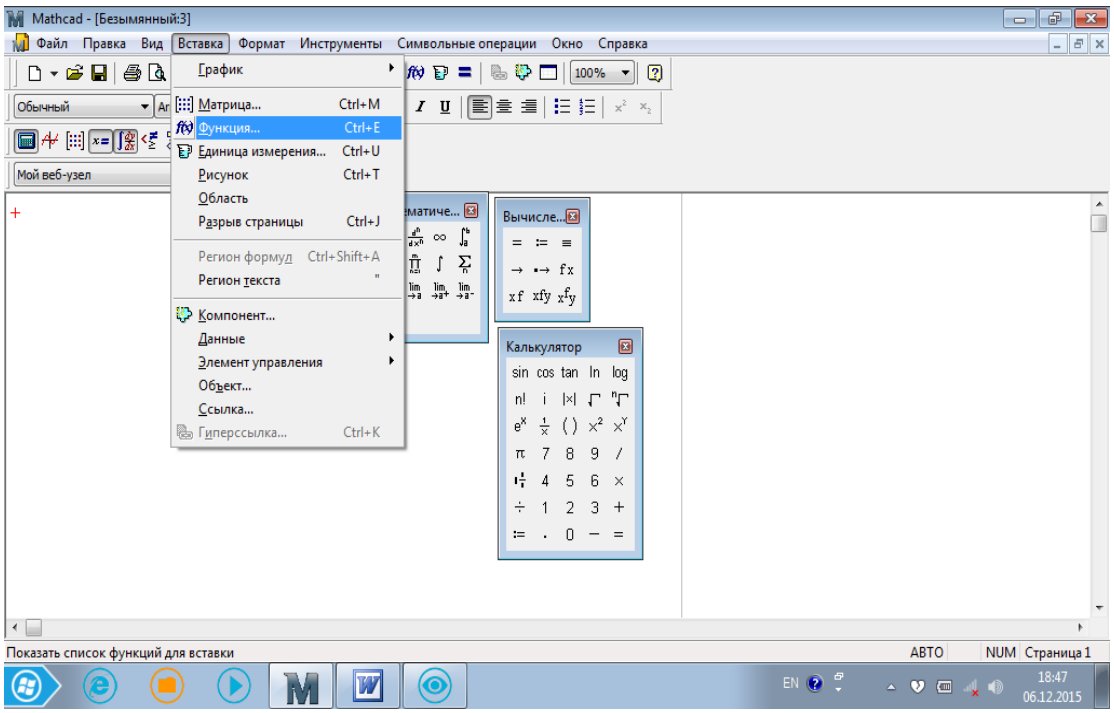
Mathcad agar limit mavjud bo`lsa, limitning intilish qiymatini qaytaradi. Limitlarni hisoblashga doir misollar rasmda keltirilgan.



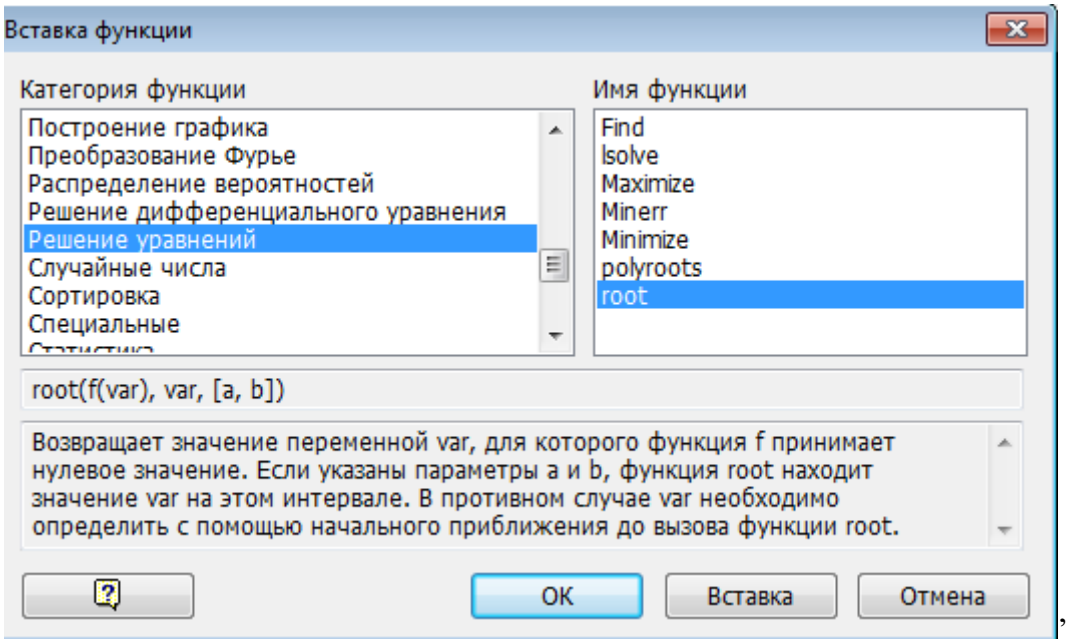
Rasm 8.2.

Sonli yechish.

Algebraik tenglamalarni yechish uchun Mathcadda bir necha funksiyalar mavjud. Ulardan Root funksiyasini ko`rib chiqamiz. Bu funksiyaga murojaat quyidagicha:



Rasm 8.3.

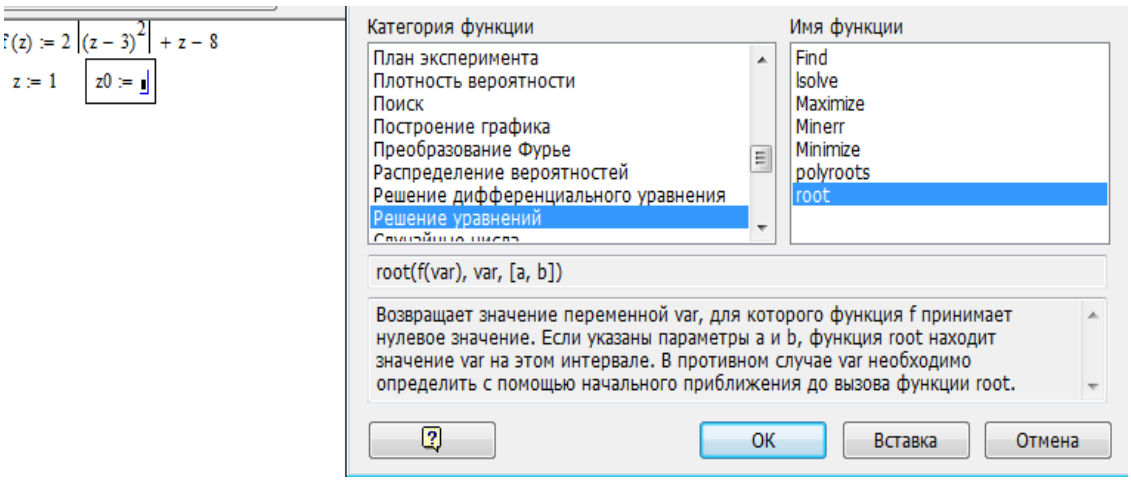


Rasm 8.4.

$$f(z) := 2\left|(z-3)^2\right| + z - 8$$

$$z := 1 \qquad z0 := \text{root}(f(z), z) = 1.149$$

Rasm 8.5.



Rasm 8.6.

Root funksiyasi yordamida funksiya hosilasini nolga tenglashtirib uning ekstremumini ham topish mumkin. Funksiya ekstremumini topish uchun quyidagi protsedurani bajarish kerak:

1. Ekstremum nuqtasiga boshlang`ich yaqinlashishni berish kerak.
2. Root funksiyasini yozib uning ichiga birinchi tartibli differentsialni va o`zgaruvchini kiritish.
3. O`zgaruvchini yozib teng belgisini kiritish.
4. Funksiyani yozib teng belgisini kiritish.

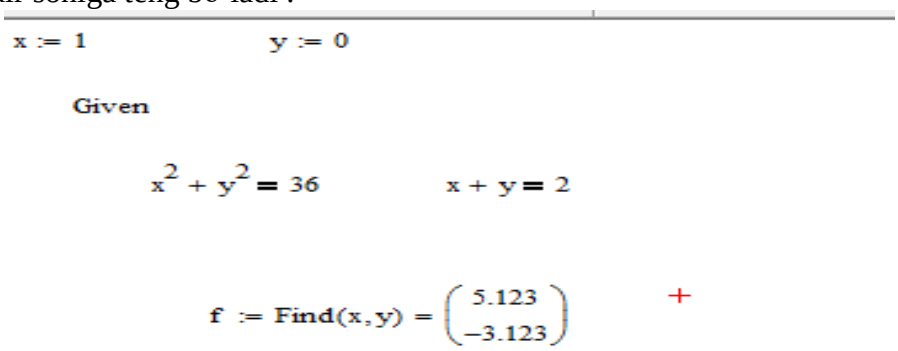
Root funksiyasi yordamida tenglamaning simvolli yechimini ham olish mumkin. Buning uchun boshlang`ich yaqinlashish talab etilmaydi. Root funksiya ichiga oluvchi ifodani kiritish kifoyadir (masalan, Root(2h2+h-bb,h)). Keyin **Ctrl+.** klavishasini birgalikda bosish kerak. Agrar simvolli yechim mavjud bo`lsa, u paydo bo`ladi.

Mathcada tenglamalar tizimini yechish.**Given…Find** hisoblash bloki yordamida amalga oshiriladi.Tenglamalar tizimini yechish uchun iteratsiya usuli qo‘llaniladi va yechishdan oldin boshlang’ich yaqinlashish barcha noma’lumlar uchun beriladi.

Tenglamalar tizimini yechish uchun quyidagi protsedurani bajarish kerak:

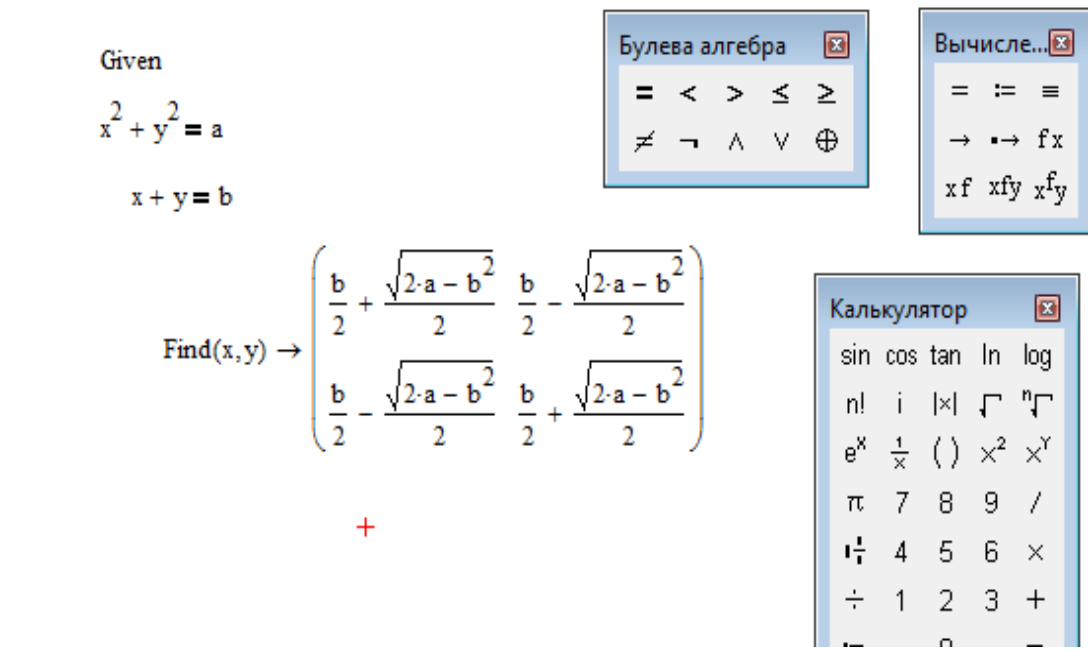
1. Tizimga kiruvchi barcha noma’lumlar uchun boshlang’ich yaqinlashishlarni berish.
2. **Given** kalit so‘zi kiritiladi.
3. Tizimga kiruvchi tenglama va tengsizlik kiritiladi.Tenglik belgisi qalin bo‘lishi kerak,buning uchun **Ctrl+=** klavishlarni birgalikda bosish kerak bo‘lad yoki **Boolean**(Bul operatorlari) panelidan foydalanish mumkin.
4. **Find** funksiyasi tarkibiga kiruvchi o‘zgaruvchi yoki ifodani kiritish.

Funksiyaga murojaat quyidagicha bajariladi:**Find(x,y).**Bu yerda x,y-noma’lumlar Noma’lumlar soni tenglamalr soniga teng bo‘ladi .



Rasm 8.7.

Find funktsiyasi funktsiya **Root** ga o`xshab tenglamalar tizimini sonli yechish bilan bir qatorda, yechimni simvolli ko`rinishda ham topish imkonini beradi



Rasm 8.8.

Mathcad tizimida sodda integrallarni hisoblash.

Ma'lumki, aniq integralni hisoblash natijasida, qandaydir egri chiziqlar bilan ajratilgan sohaning yuzini hisobga olgan bo‘lamiz. Ikki karrali integrallarni hisoblab figuraning hajmi topiladi. Murakkab ko‘rinishdagi integrallarni son qiymatini topishda turli xil metodlardan foydalanamiz, ba'zi vaqtda esa vaqtdan yutqazamiz. Shunda biz yuqori tartibli integrallarning son qiymatini hisoblashda Mathcad tizimidan foydalanishimiz mumkin. Mathcad tizimida bajarilgan integralning qiymati aniq va tez hisoblanadi.

Mathcadda integralni hisoblash paneldan tugmasini tanlaymiz va va aniqmas integralning son qiymatini topishda tugmasidan, aniq integralning qiymatini hisoblashda esa tugmasidan foydalanamiz.

Quyida Mathcad muhitida hisoblangan aniq va aniqmas integrallar, hamda ikki karrali va uch karrali integrallar keltirilgan.

$g(x) = \dfrac{1}{1+\cos(x)}$ funksiyaning boshlang’ichi va [0, 3.14/2] oraliqdagi aniq integrallarni hisoblang.

Yechish: $g(x) = \dfrac{1}{1+\cos(x)}$ funksiyaning boshlang’ichini hisoblash uchun asboblar panelidagi $\int \blacksquare\, d\blacksquare$ simvoldan foydalanamiz va natijani ko‘rish uchun $\blacksquare \rightarrow$ tugmasini bosish kerak. Berilgan oraliqdagi aniq integralni hisoblash uchun ham shu paneldagi $\int \blacksquare\, d\blacksquare$

simvoldan foydalanamiz va natijani olish uchun ham shu paneldagi $\int \blacksquare\, d\blacksquare$ simvoldan foydalanamiz va natijani olish uchun “=” tugmasini bosish kifoY.

$$g(x) := \frac{1}{1+\cos(x)} \rightarrow \tan\left(\frac{1}{2}\cdot x\right) \qquad \int_{0}^{\frac{3.14}{2}} \frac{1}{\cos(x)}\,dx = 0.999$$

Quyida keltirilgan funksiyalarning boshlang’ichi va oraliqdagi integrallari asboblar panelidagi $\int \blacksquare\, d\blacksquare$ simvoldan foydalanamiz va natijani ko‘rish uchun $\blacksquare \rightarrow$ tugmasini bosib, oraliqdagi aniq integralni hisoblash uchun ham shu paneldagi $\int \blacksquare\, d\blacksquare$ simvoldan foydalanib natijalar olinganligi keltirilgan.

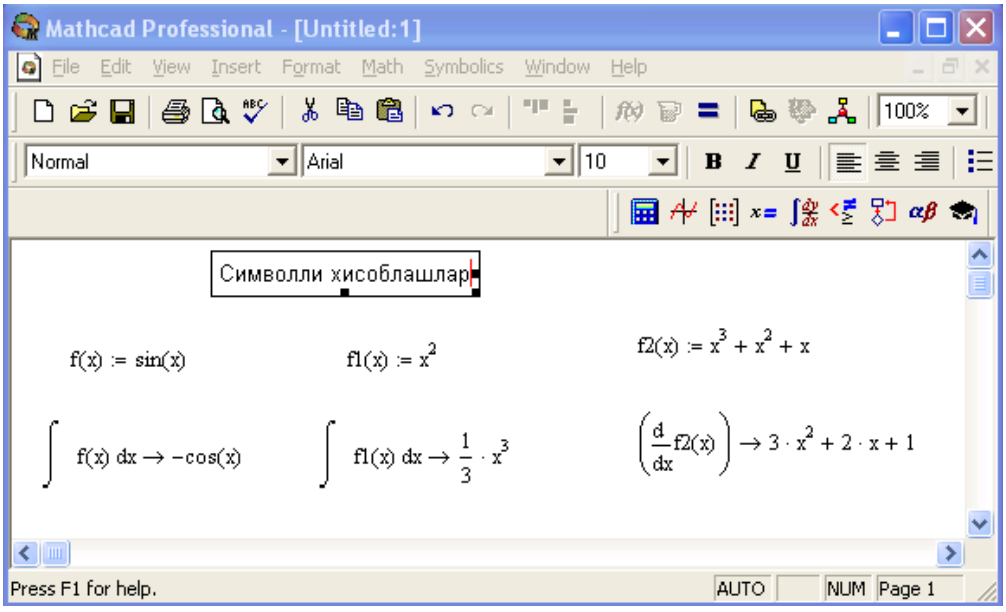
9-AMALIYOT ISHI
MATHCADDA SIMVOLLI XISOBLASH.

Maqsad: Mathcad muxitida simvolli o‘zgartirishlar imkoniyatini o‘rganish, simvol o‘zgartirishlarni bajarish asoslarini o‘zlashtirish, soda simvolli o‘zgartirishlarni bajarish.

Nazariy qism

Belgili (simvolli) hisoblashlar.

Sonli hisoblashlardan tashqari Mathcad belgili (simvolli) hisoblashlarni ham amalga oshiradi. Bu degani hisoblashlar natijasini analitik ko`rinishda tasvirlash mumkin. Masalan, aniqmas integral, differentsiallash va boshqa shu kabi masalalarni echishda uning echimini analitik ko`rinishda tasvirlaydi. Bunday oddiy simvolli hisoblashlar rasmda keltirilgan.



Rasm 9.1.

Simvolli hisoblashlarni bajarishda ikkita asosiy vosita mavjud:

- Simвolnie operasii (Simvolli hisoblash) menyusi;
- Matematicheskiy panelidan Simвolnie preoбrazovaniya paneli.

Bu vositalar ancha murakkab simvolli hisoblashlarda qo`llaniniladi. Hozir esa oddiy simvolli hisoblashni bajarishning eng sodda usuli, ya'ni tez-tez ishlatilib turiladigan usullardan biri - simvolli tenglik belgisi (→) usulini ko`rib chiqamiz. Quyida bu usuldan foydalanishning ketma-ketlik tartibi berilgan:

1.**Математические** panelidan **Калькулятор** va **Математический анализ** tugmalari bosiladi.

2.Ochilgan panel oynalaridan kerakli ifodani kiritiladi (misol tariqasida aniqmas integral qaralayapdi).

3.Kiritish joylari to`ldiriladi, ya'ni funktsiya nomi va o`zgaruvchi nomi kiritiladi.

4. Simvolli belgi tengligi (→) belgisi kiritiladi.

Simvolli operatsiyalar **Символьные операции** — **Вычислить**(hisoblash) — **Аналитически** (analitik **SHIFT+F9**) buyruqlari yordamida beriladi. Mathcad agar limit mavjud bo`lsa, limitning intilish qiymatini qaytaradi. Limitlarni hisoblashga doir misollar pastki rasmda keltirilgan.

Simvolli hisoblash vositalari.

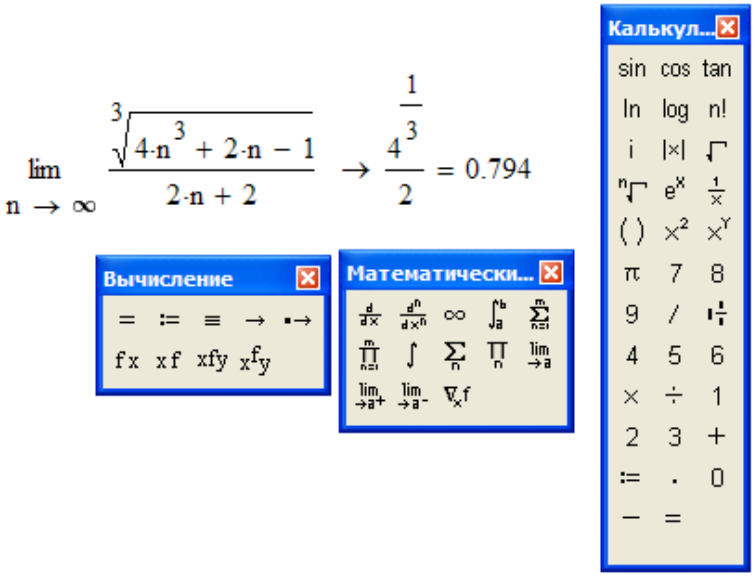
Vosita	Shablon	Ta'rifi
float	• Float, •→	Siljuvchi nuqtani hisoblash
complex	• complex, •→	Kompleks son formasiga o`tkazish
expand	• expand, •→	Bir necha o`zgaruvchili yig`indi, ko`paytma va darajani ochish
solve	• solve, •→	Tenglama va tenglamalar tizimini echish
simplify	• simplify, •→	Ifodalarni ixchamlash
substitute	• substitute, •→	Ifodalarni hisoblash
collect	• collect, •→	Oddiy yig`indida tasvirlangan palinom ko`rinishdagi ifodani ixchamlash
series	• series, •→	Darajali qatorda ifodani yoyish
assume	• assume, •→	Aniq qiymat bilan yuborilgan o`zgaruvchini hisoblash
parfrac	• parfrac, •→	Oddiy kasrga ifodalarni yoyish
coeffs	• coeffs, •→	Polinom koeffitsienti vektorini aniqlash
factor	• factor, •→	Ifodalarni ko`paytuvchilarga yoyish
fourier	• fourier, •→	Fure to`g`ri almashtirishi
laplace	• laplace, •→	Laplas to`g`ri almashtirishi
ztrans	• ztrans, •→	To`g`ri z-almashtirish
invfourier	• invfourier, •→	Fure teskari almashtirishi
invlaplace	• invlaplace,•→	Laplas teskari almashtirishi
invztrans	• invztrans, •→	Teskari z-almashtirish
$M^T\rightarrow$	• $^T\rightarrow$	Matritsani transponirlash
$M^{-1}\rightarrow$	• $^{-1}\rightarrow$	Matritsaga murojaat
$\|M\|\rightarrow$	$\|•\|\rightarrow$	Matritsa determinantini hisoblash
Modifier		Modifier panelini chiqarish

Limitlarni hisoblash.

Mathcadda limitlarni hisoblashning uchta operatori bor.

1.**Математические** panelidan **Калькулятор** va **Математический анализ** tugmalari bosiladi.

4-topshiriq



Rasm 9.2.

1. **Математические** panelidan **Математический анализ**tugmasi basilsa, **Математический анализ** paneli ochiladi. U yerning pastki qismida limitlarni hisoblash operatorlarini kiritish uchun uchta tugmacha mavjud. Ularning birini bosish kerak.

2.lim so`zining o`ng tomonidagi kiritish joyiga ifoda kiritiladi.

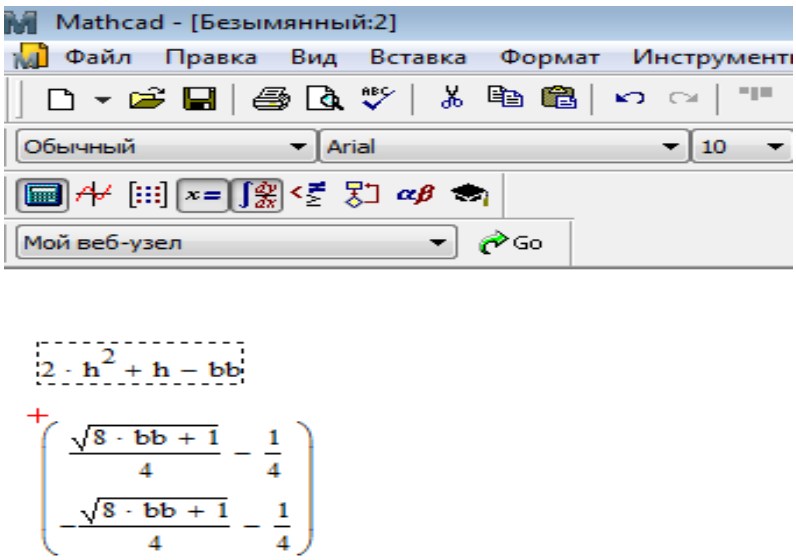
3.lim so`zining ostki qismiga o`zgaruvchi nomi va uning intiladigan qiymati kiritiladi.

Simvolli yechish.

Tenglamaning simvolli yechimini topish uchun quyidagi ishlar ketma-ketligini bajarish kerak:

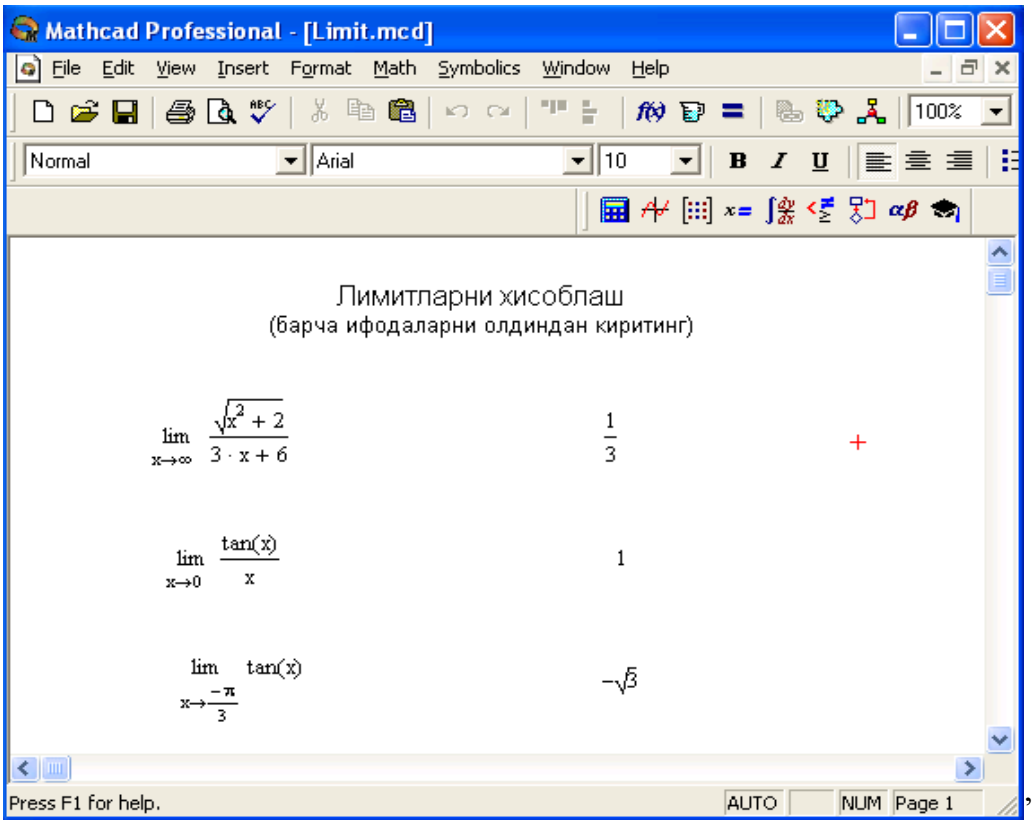
1.Yechiladigan tenglamani kiritish va tenglama yechimi bo`lgan o`zgaruvchini kursorning ko`k burchagida ajratish.

2. **Символьные операции** menyudan — **Переменная** —— **Решить** (Belgili amallar – – O`zgaruvchi — Yechish) buyrug`ini tanlash. Tenglamani yechish rasmda keltirilgan.



Rasm 9.3.

Mathcad agar limit mavjud bo`lsa, limitning intilish qiymatini qaytaradi. Limitlarni hisoblashga doir misollar rasmda keltirilgan.



Rasm 9.4.

Massivlar bilan ishlash.

Matematik masalalarni yechishda Mathcadning xizmati matritsalar ustida amallar bajarishda yaqqol ko`rinadi. Matritsalar katta bo`lganda bu amallarni bajarish ancha murakkab bo`lib, kompyuterda Mathcadda dastur tuzishni talab etadi. Mathcad tizimida bunday ishlarni tez va yaqqol ko`rinishda amalga oshirsa bo`ladi.

Hujjatga matritsani kiritish uchun quyidagi ishlar ketma-ketligi bajariladi:

1.Matritsa nomini va (:=) yuborish operatorini kiritish.

2.Matematika panelidan **Матрица** tugmachasi bosiladi. Natijada **Матрица** paneli ochiladi. Ochilgan muloqot oynasidan ustun va satr sonlari kiritilib Ok tugmasi bosiladi. Bu holda ekranda matritsa shabloni paydo bo`ladi.

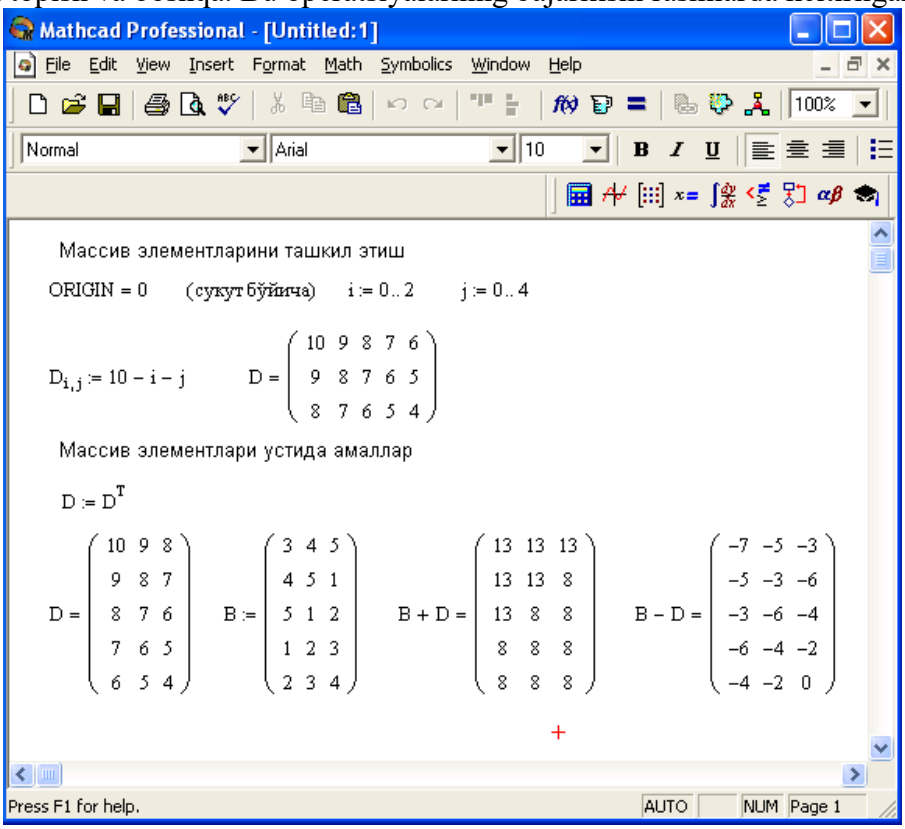
3.Har bir joy sonlar bilan to`ldiriladi, ya'ni matritsa elementlari kiritiladi.

Matritsalar ustida asosiy amallar. Mathcad matritsalar bilan quyidagi arifmetik operatsiyalarni bajaradi: matritsani matritsaga ko`paytirish, qo`shish, va ayirish, bundan tashqari transponirlash operatsiyasini, murojaat qilish, matritsa determinantini hisoblash, maxsus son va maxsus vektorni topish va boshqa.

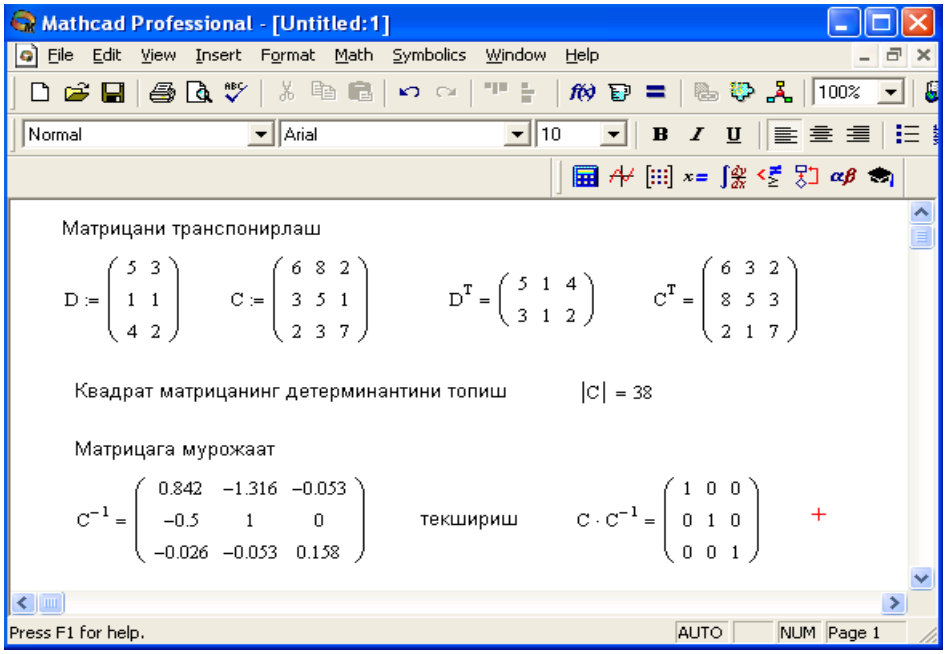
Shablon yordamida 100 dan ortiq elementga ega bo`lgan matritsani kiritish mumkin. Vektor – bu bir ustunli matritsa deb qabul qilinadi. Har qanday matitsa elementi matritsa nomi bilan uning ikki indeksi orqali aniqlanadi. Birinchi indeks qator nomerini, ikkinchi indeks – ustun nomerini bildiradi. Indekslarni kiritish uchun matematika vositalar panelidan Matrix panelini ochib, u erdan Vector and Matrix Toolbar, keyin Subscript (Pastki indeks) bosiladi. Klaviaturadan buni [(ochuvchi kvadrat qavs) yordamida bajarsa ham bo`ladi. Massiv elementi nomeri 0,1 yoki istalgan sondan boshlanishi mumkin (musbat yoki manfiy). Massiv elementi numeri boshqarish uchun maxsus ORIGIN nomli o`zgaruvchi ishlatiladi. Avtomatik 0 uchun ORIGIN=0 deb yoziladi. Bunda massiv elementlari nomeri nuldan boshlanadi. Agar nuldan boshqa sondan boshlansa unda ORIGIN dan keyin ikki nuqta qo`yiladi, masalan ORIGIN:=1.

D matritsaning pastki indekslardan foydalanib elementlarini topish ko`rsatilgan. ORIGIN=0 bo`lgani uchun avtomatik ravishda birinchi element 10 ga teng.

Matritsalar ustida asosiy amallar. Matchad matritsalar bilan quyidagi arifmetik operatsiyalarni bajaradi: matritsani matritsaga qo`shish, ayirish va ko`paytirish, bundan tashqari transponirlash operatsiyasini, murojaat qilish, matritsa determinantini hisoblash, maxsus son va maxsus vektorni topish va boshqa. Bu operatsiyalarning bajarilishi rasmlarda keltirilgan.

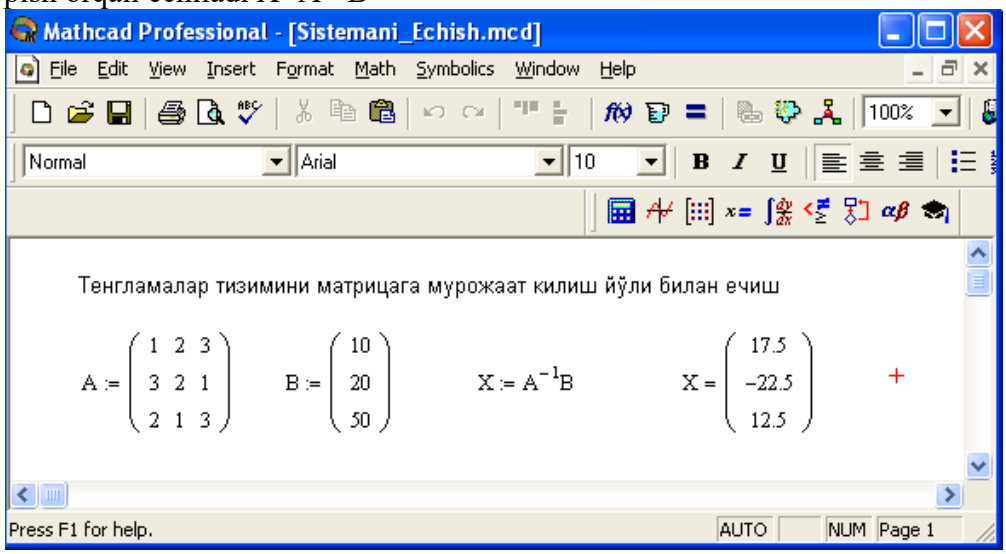


Rasm 9.5.



Rasm 9.6.

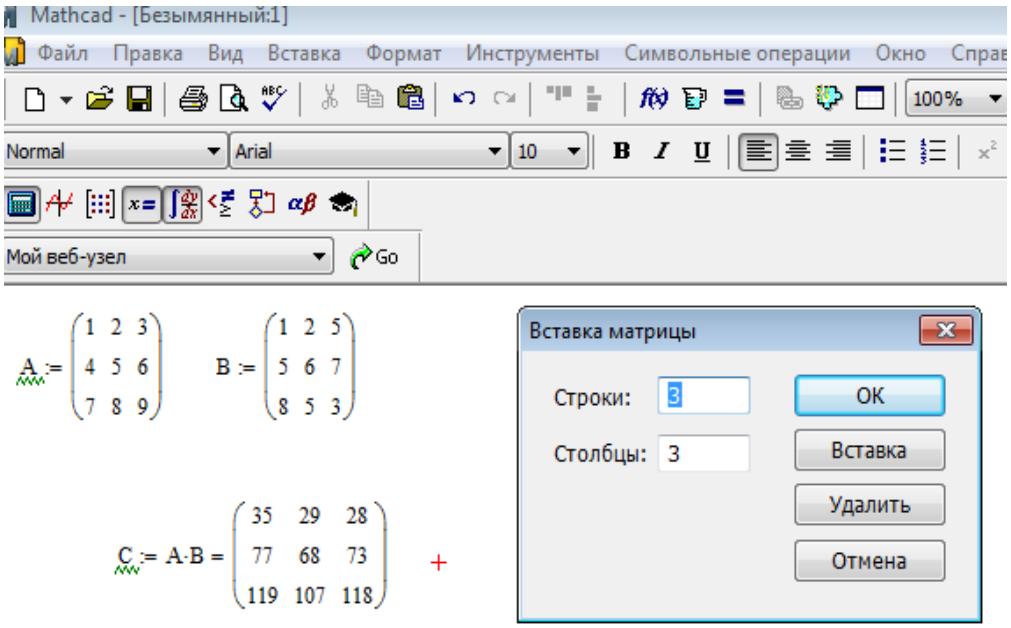
Matritsali tenglamalarni echish. Matritsali tenglamalar bu chiziqli algebraik tenlamalar tizimi bo`lib A·X=B ko`rinishda yoziladi va u matritsaga murojaat qilish yo`li bilan teskari matritsani topish orqali echiladi $X=A^{-1}\cdot B$



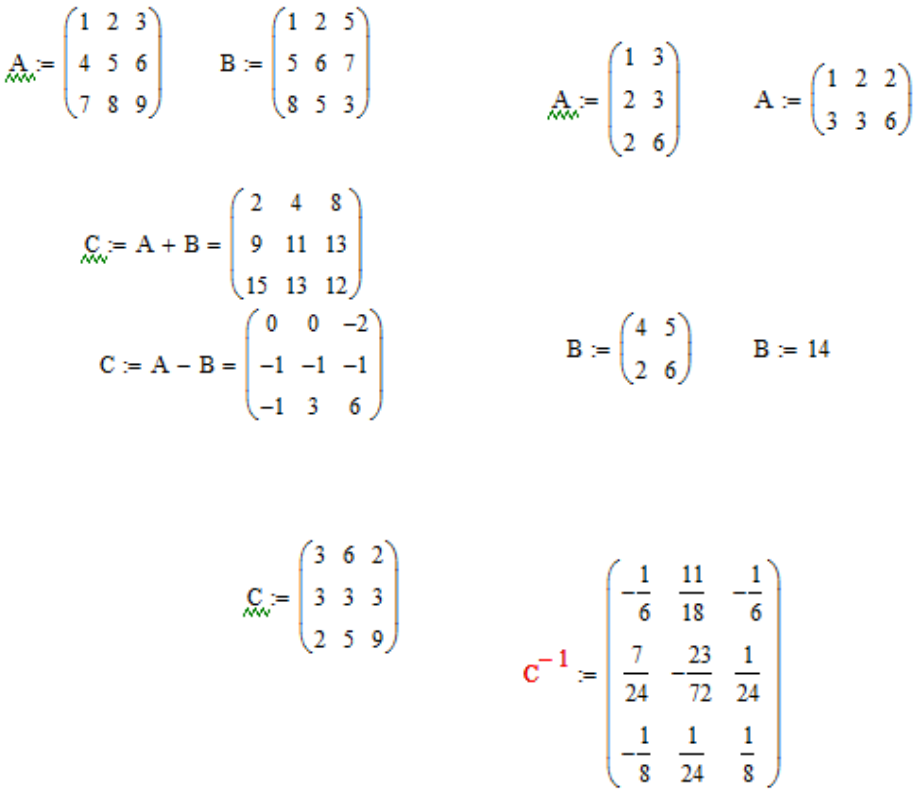
Rasm 9.7.

Matritsalar ustida simvolli operatsiyalar Simвolnie operasii (Simvolli hisoblash) menyusining buyruqlari va simvolli tenglik belgisi (→) yordamida bajariladi.

Quyidagi misollarda matritsalar ustida amallar bajarilishi ko‘rsatilgan:

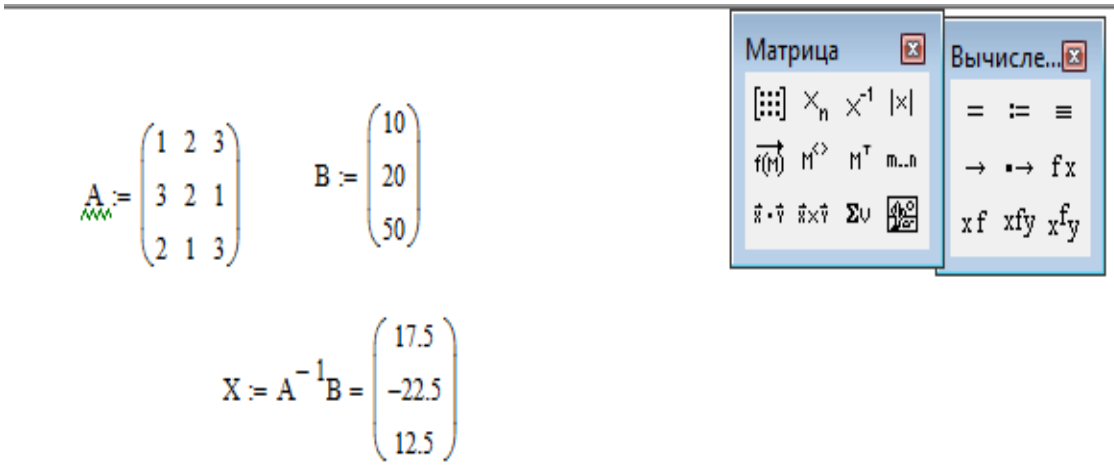


Rasm 9.8.



Rasm 9.9.

Matritsali tenglamalar bu chiziqli algebraik tenglamalar tizimi bo`lib $A \cdot X=B$ ko`rinishda yoziladi va u matritsaga murojaat qilish yo`li bilan teskari matritsani topish orqali yechiladi $X=A^{-1} \cdot B$



$$A := \begin{pmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \\ 2 & 1 & 3 \end{pmatrix} \qquad B := \begin{pmatrix} 10 \\ 20 \\ 50 \end{pmatrix}$$

$$X := A^{-1}B = \begin{pmatrix} 17.5 \\ -22.5 \\ 12.5 \end{pmatrix}$$

Rasm 9.10.

10-AMALIYOT ISHI
MATHCAD PAKETI VA UNING IMKONIYATLARI. BIR VA IKKI O‘LCHAMLI FUNKSTIYALARNING GRAFIGINI QURISH.

Maqsad: MathCad tizimida ishlash haqida tushunchaga ega bo‘lish.Matematika ifodalarni hisoblash boyicha masalalar yechishni o‘rganish.

Nazariy qism

Mathcad tizimi va unda ishlash texnologiyasi

Matematik paketlar, ayniqsa Mathcad –mashhur paket bo‘lib, ilmiy – texnikaviy soha mutaxassislariga dasturlashning nozik elementlariga e’tibor berilmasdan (masalan:fortran, C, paskal, BASIC va boshqalar kabi) kompyuterda matematik modellashtirishni amalga oshirishga katta yordam beradi.

Mathcad 1986-yilda Massachueset texnika unversitetida olim Allen Razdov tomonidan yaratilgan.Hozirgi kunda Mathcad dasturini qullab versiyalari (Topshiriqlari) yaratilgan bo‘lib, ulardan oxirgisi Mathcad s 1.0 po 4.xx, Mathcad 1.0 dan 15 versiyalarigacha ishlab chiqarilgan. Tabiiyki, har bir Topshiriq uzidan oldingisidan foydalanish uchun qulayligi va boy imkoniyatlari bilan farq qiladi.

Quyida Mathcad matematik dasturlash muhitida ishlashning yaqqol ajralib turadigan imkoniyatlarini sanab o‘tmoqchimiz:

- **Mathcad** muhitida matematik ifoda, qabul qilingan ko‘rinishda ifodalanadi. Masalan, daraja yuqorida, indeks pastda, integralning yuqori va quyi chegaralari esa an’anaviy joyida turadi.
- **Mathcad** muhitida “dasturlashni” tuzish va ularning bajarilish jarayoni parallel kechadi. Foydalanuvchi **Mathcad** – hujjatida yangi ifoda kiritar ekan, uning qiymatini hisoblash va ifodani kiritishda yo‘l qoyilgan yashirin xatoliklarni grafigini ko‘rish imkoniyati ham mavjud.
- **Mathcad** paketi yetarli darajada qudratli matematik apparat bilan qurollanganki, ular orqali tashqi pratseduralarni chaqirmasdan turib paydo bo‘ladigan muammolarni hal qilishimiz mumkin.

Mathcadga xos bo‘lgan ayrim hisoblovchi qurilmalarni sanab o‘tmoqchimiz:

- Chiziqli va chiziqli bo‘lmagan algebraik tenglama va sistemalarni yechish;
- Oddiy differensial tenglama va sistemalarni (Koshi masalasi va chegaraviy masala) yechish;
- Xususiy hosilali differensial tenglamalarni yechish;
- Berilganlarni static qayta ishlov berish (interpolyatsiya, ekstrapolyatsiya, approksimatsiya va ko‘pgina boshqa amallar);
- Vektor va matritsalar bilan ishlash (chiziqli algebra va boshqalar);
- Funksional bog’liqlikning maksimum va minimumini izlash.

Mathcad paketi matematik va fizik-kimyoviy formulalarga, hamda o‘zgarmaslarga asoslangan yordamchi qo‘llanmalar bilan boyitilgan.

Foydalanuvchi o‘z oldiga qoyilgan masalani yechish bilan cheklanibgina qolmay, fizikaviy masalalarni yechishda o‘lchovni hisobga olish imkoniyatiga ega. Bunda foydalanuvchi birliklar sistemasini ham tanlashi mumkin.

Matematik ifodalarni qurish va hisoblash. Tahrirlashda klaviaturadan ham foydalanish mumkin, masalan

Boshlang`ich holatda ekranda kursor krestik ko`rinishda bo`ladi. Ifodani kiritishda u kiritilayotgan ifodani egallab olgan ko`k burchakli holatga o`tadi. Mathcadning har qanday operatorini kiritishni uchta usulda bajarish mumkin:

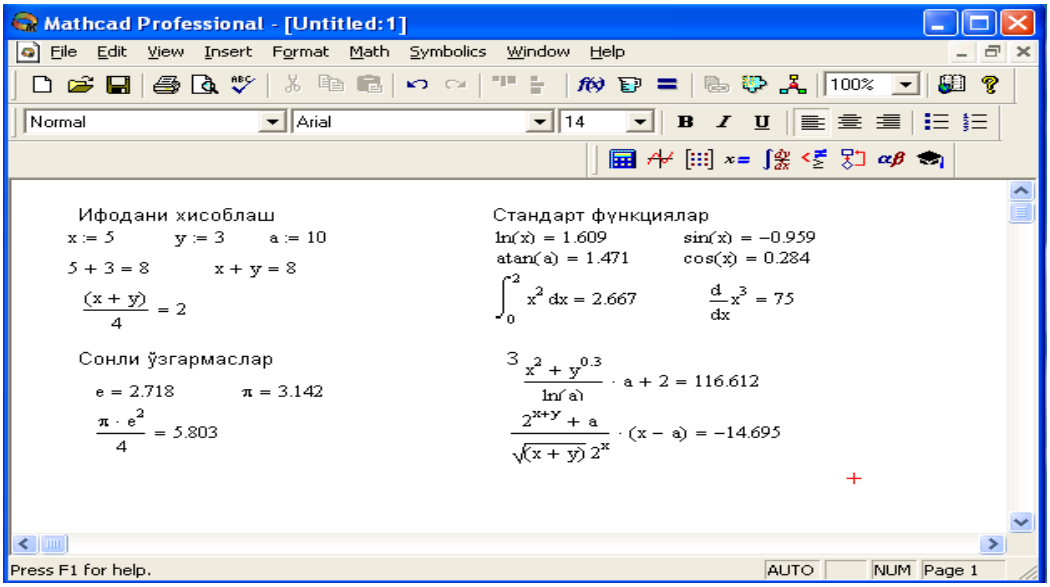
- menyu buyrug`idan foydalanib;
- klaviatura tugmalaridan foydalanib;
- matematik paneldan foydalanib.

O`zgauvchilarga qiymat berish uchun yuborish operatori “:=” ishlatiladi. Hisoblashlarni amalga oshirish uchun oldin formuladagi o`zgaruvchi qiymatlari kiritiladi, keyin matematik ifoda yozilib tenglik “=” belgisi kiritiladi, natijada ifoda qiymati hosil bo`ladi.

Oddiy va matematik ifodalarni tahrirlashda menyu standart buyruqlaridan foydalaniladi.

- qirqi bo‘lish – Ctrl+x;
- nusxa olish – Ctrl+c;
- qo`yish – Ctrl+v;
- bajarishni bekor qilish – Ctrl+z.

Oddiy matematik ifodalarni hisoblash quyidagi rasmda keltirilgan:



Rasm 10.1.

Diskret o`zgaruvchilar va sonlarni formatlash.

Mathcadda diskret o`zgaruvchilar deganda sikl operatorini tushunish kerak. Bunday o`zgaruvchilar ma'lum qadam bilan o`suvchi yoki kamayuvchi sonlarni ketma-ket qabul qiladi. Masalan:

x:=0..5. Bu shuni bildiradiki bu o`zgaruvchi qiymati qator bir necha qiymatlardir, ya'ni x=0,1,2,3,4,5.

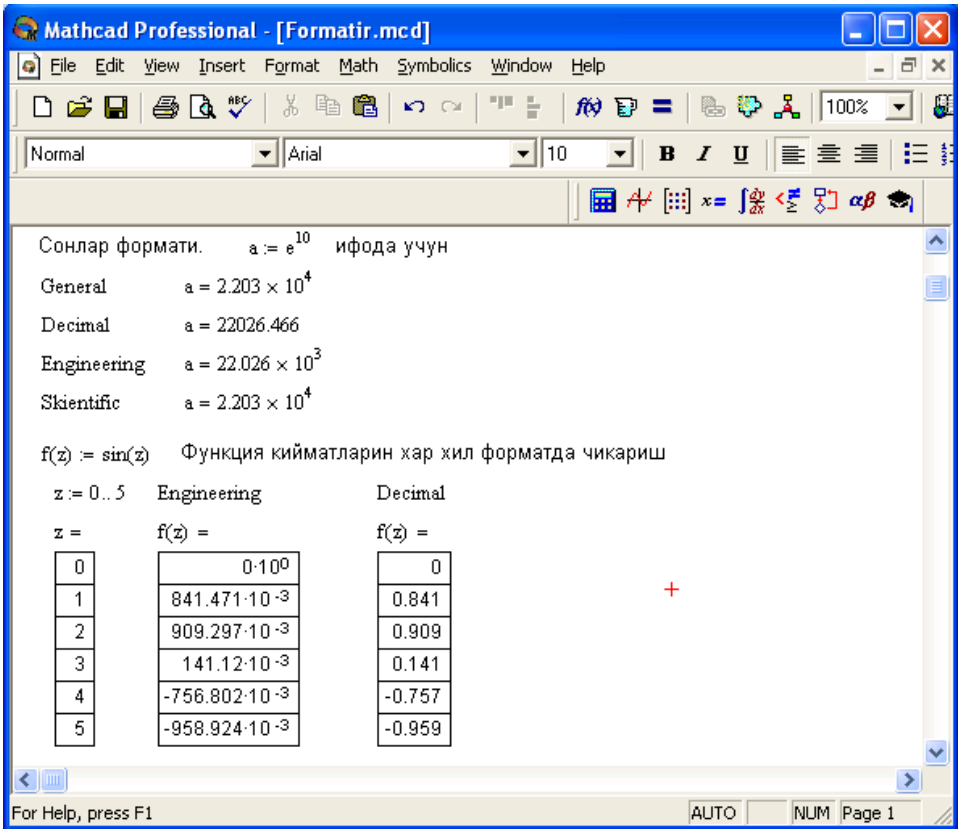
x:=1,1.1..5. Bunda 1 – birinchi sonni, 1,1 – ikkinchi sonni, 5 - oxirgi sonni bildiradi.

x:=A,A+B..B. Bunda A – birinchi, A+B – ikkinchi, B - oxirgi sonni bildiradi.

Izoh! O`zgaruvchi diapazonini ko`rsatishda ikki nuqta o`rniga klaviaturadan (;) nuqta vergul kiritiladi yoki Matrix (Matritsa) panelidan Range Variable (Diskret o`zgaruvchi) tugmasi bosiladi. Hisoblangan qiymatni chiqarish uchun esa o`zgaruvchi va tenglik belgisini kiritish kifoY. Natijada o`zgaruvchi qiymati ketma-ket jadvalda chiqadi. Masalan, x:=0..5 deb yozib, keyin x= kiritish kerak.

Foydalanuvchi funktsiyaning uning argumentiga mos qiymatlarini hisoblab chiqarish va bu qiymatlarni jadval yoki grafik ko`rinishda tasvirlashda diskret o`zgaruvchilardan foydalanish qulaylikni keltiradi. Masalan, f(x)=sin(x)·Cos(x) funktsiya qiymatlarini x ning 0 dan 5 gacha bo`lgan qiymatlarida hisoblash kerak bo`lsa, u holda quyidagi kiritishni amalga oshirish kerak: f(x)=sin(x)·Cos(x) x:=0..5 f(x)=*javob.*

Sonlarni formatlash. Odatda Mathcad 20 belgi aniqligigacha matematik ifodalarni hisoblaydi. Hisoblash natijalarini kerakli formatga o`zgartirish uchun sichqoncha ko`rsatgichini sonli hisob chiqadigan joyga keltirib, ikki marta tez-tez bosish kerak. Natijada sonlarni formatlash natijasi Result Format oynasi paydo bo`ladi.



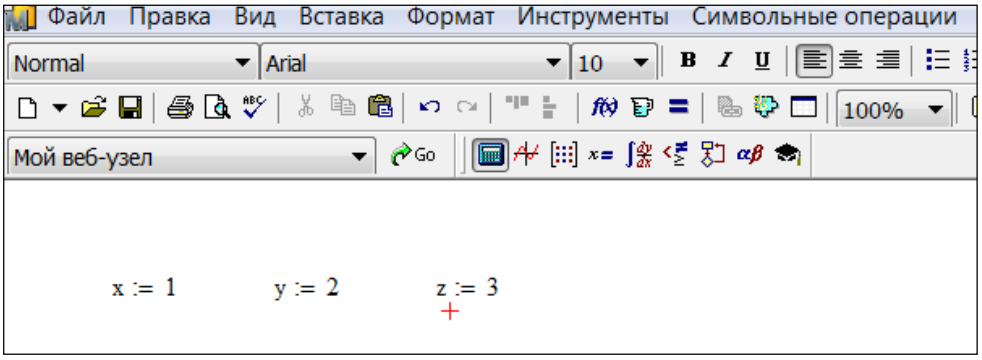
Rasm 10.2.

Mathcad tizimida ishlash.Sodda hisoblashlar bajarish boyicha topshiriqlar.

17) x,y,z o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

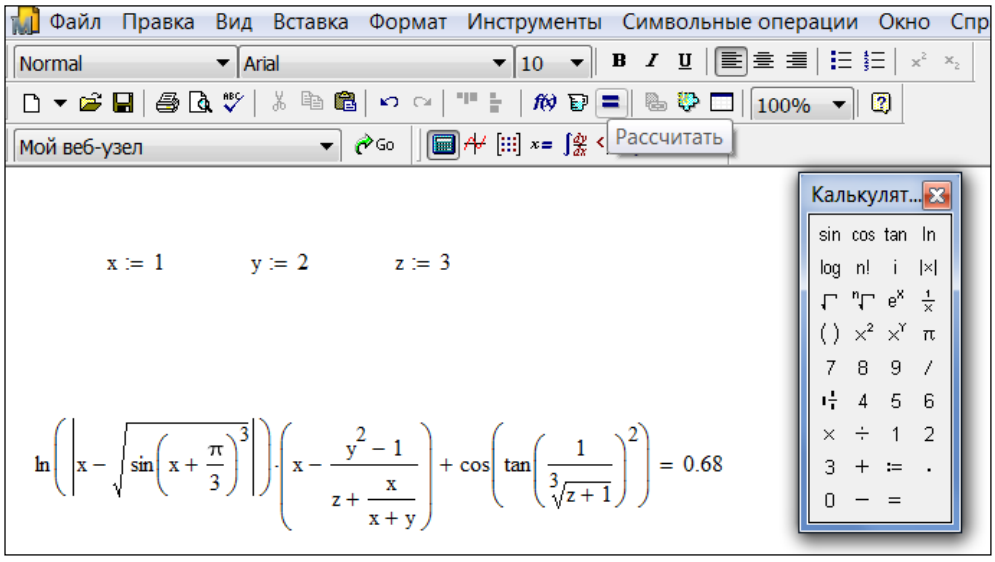
$$\ln\left|\left(x-\sqrt{\sin^3\left(x+\frac{\pi}{3}\right)}\right)\right|\left[x-\frac{y^2-1}{z+\frac{x}{x+y}}\right]+\cos\left[tg^2\left[\frac{1}{\sqrt[3]{z+1}}\right]\right]$$

Dastlab o‘zgaruvchilarning qiymatini kiritamiz:



Rasm 10.3.

So‘ngra **Калькулятор** paketidan foydalanib, ifodani kiritamiz; (=) (tenglik) belgisini bosib,natijaga erishamiz.

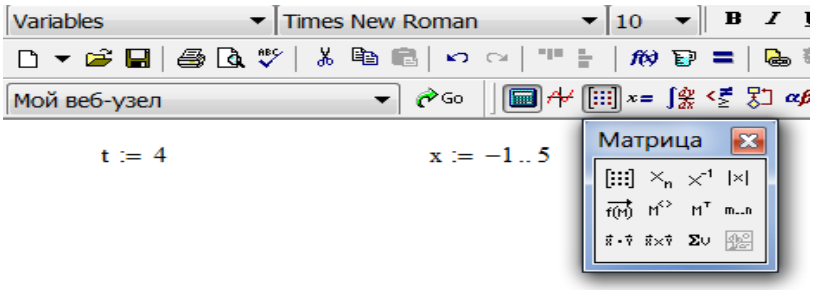


Rasm 10.4.

18) [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling:

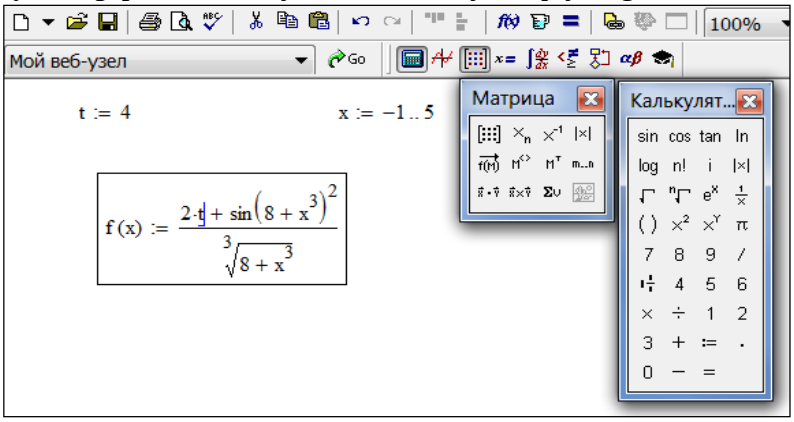
$$d = \frac{2m + \sin^2(8 + x^3)}{\sqrt[3]{8 + x^3}}, m = 4, a = -1, b = 5, h = 1.$$

Dastlab o‘zgaruvchilarni kiritamiz; [-1,5] oraliqni kiritish uchun **Матрица** paketining (**m..n)** amalidan yoki klaviaturadagi (**J)** klavishidan foydalanamiz.



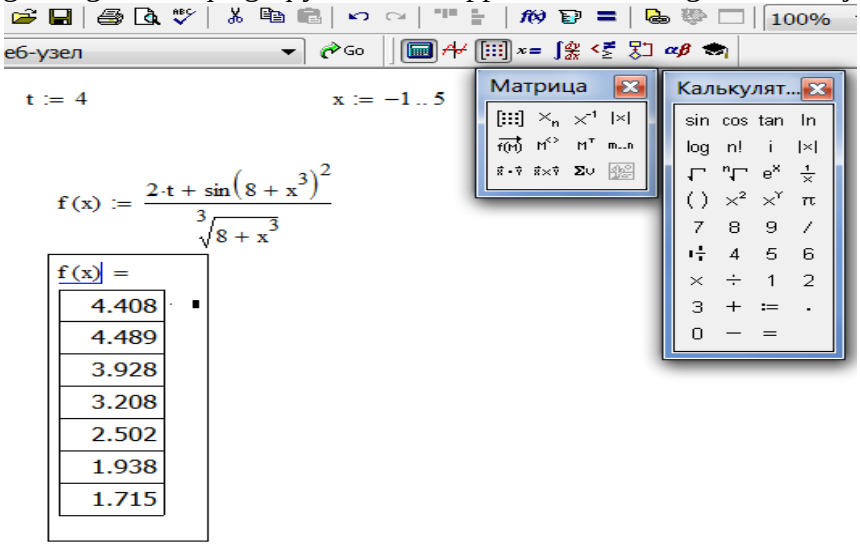
Rasm 10.5.

So‘ngra **Калькулятор** paketidan foydalanib funksyani quyidagicha kiritamiz:



Rasm 10.6.

Funksiyaning berilgan oraliqdagi qiymatlarini toppish uchun so‘ngi amalni bajaramiz:



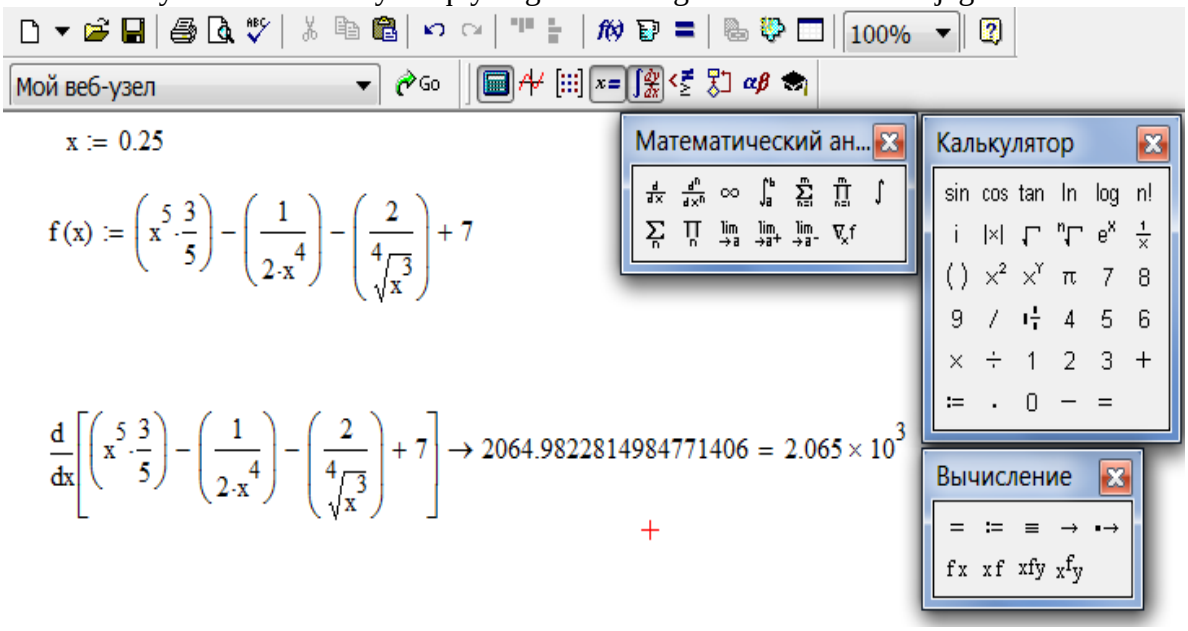
Rasm 10.7.

19) x=0.25 Funksiya hosilasini berilgan qiymatda hisoblang:

$$f(x) := \left(x^{5}\cdot\frac{3}{5}\right) - \left(\frac{1}{2\cdot x^{4}}\right) - \left(\frac{2}{\sqrt[4]{x^{3}}}\right) + 7$$

Ushbu fuksiyani xosilasini hisoblash uchun **Математические** panelidagi **Вычисление Математические** va **Калькулятор** paketlari kerak bo‘ladi.

Paketlar yordamida funksyani quyidagi ko‘rinishga keltiramiz va natijaga erishamiz:

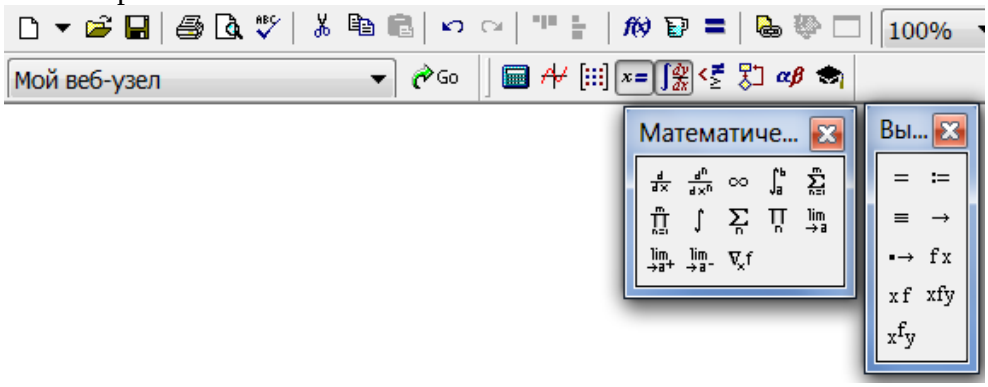


Rasm 10.8.

20) Quyidagi limitni toping:

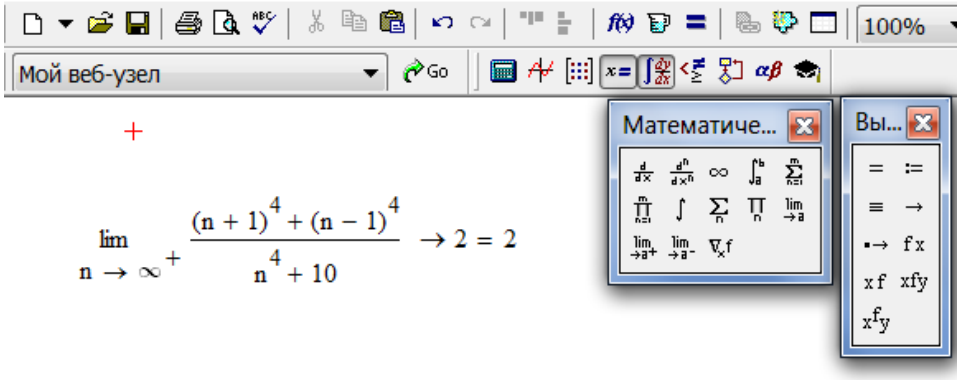
$$\lim_{n\to\infty}\frac{(n+1)^4+(n-1)^4}{n^4+10}$$

Ushbu limitni toppish uchun bizga **Математические** panelidagi **Калькулятор** va **Вычисление** paketlari kerak bo‘ladi:



Rasm 10.9.

Dastlab ifodani kiritamiz va natijaga erishish uchun **Вычисление** paketidan foydalanamiz:

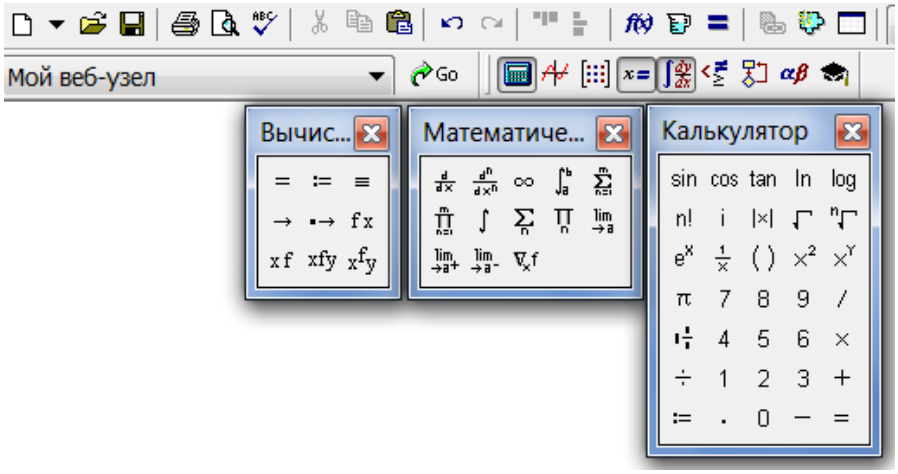


Rasm 10.10.

21) Aniq integralni hisoblang va natijani solishtiring:

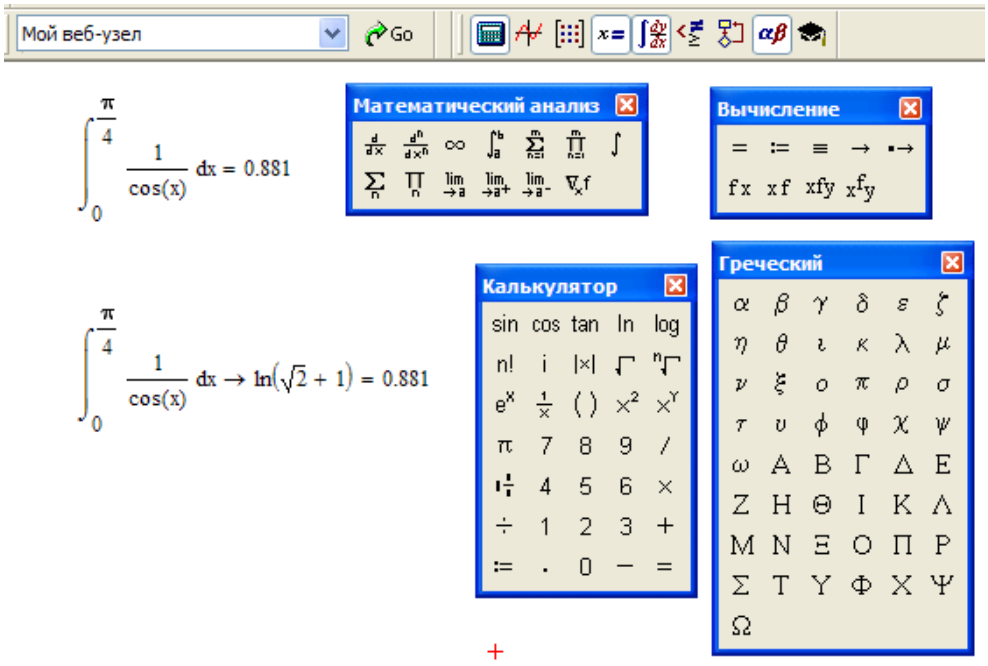
$$\int_0^{\frac{\pi}{4}} \frac{1}{\cos(x)}\,dx \to \ln(\sqrt{2}+1) = 0.881 \qquad \int_1^4 e^x \left(1 - \frac{e^{-x}}{x^2}\right) dx = 51.13$$

Ushbu aniq integrallarni hisoblash uchun ***математические*** panelidagi ***Калькулятор, Вычисление,*** va ***Математическиеataliz*** paketlaridan foydalanamiz.



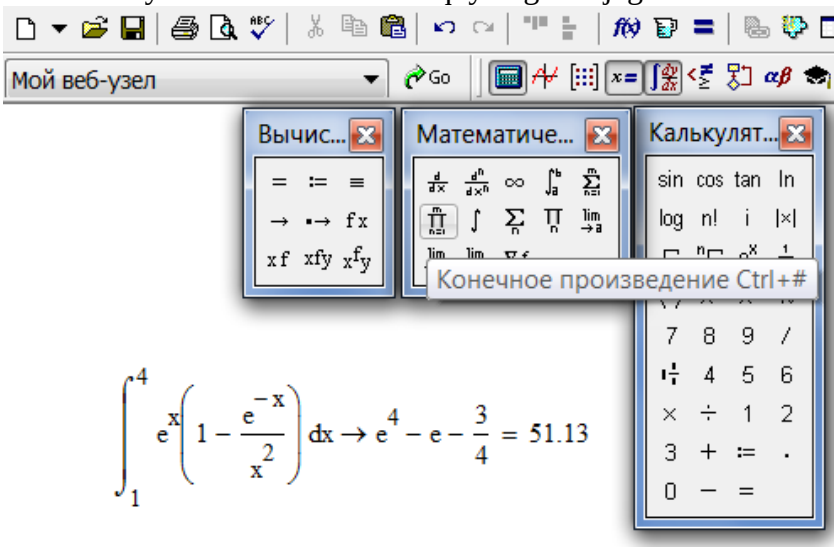
Rasm 10.11.

So‘ng aniq integralni kiritib, quyidagi natijaga erishamiz:



Rasm 10.12.

Grek alifbosi harflarini ishlatish uchun **Греческий** paketlaridan ham foydalandik. 2-aniq integralni shunday tartibda kiritamiz va quyidagi natijaga erishamiz:



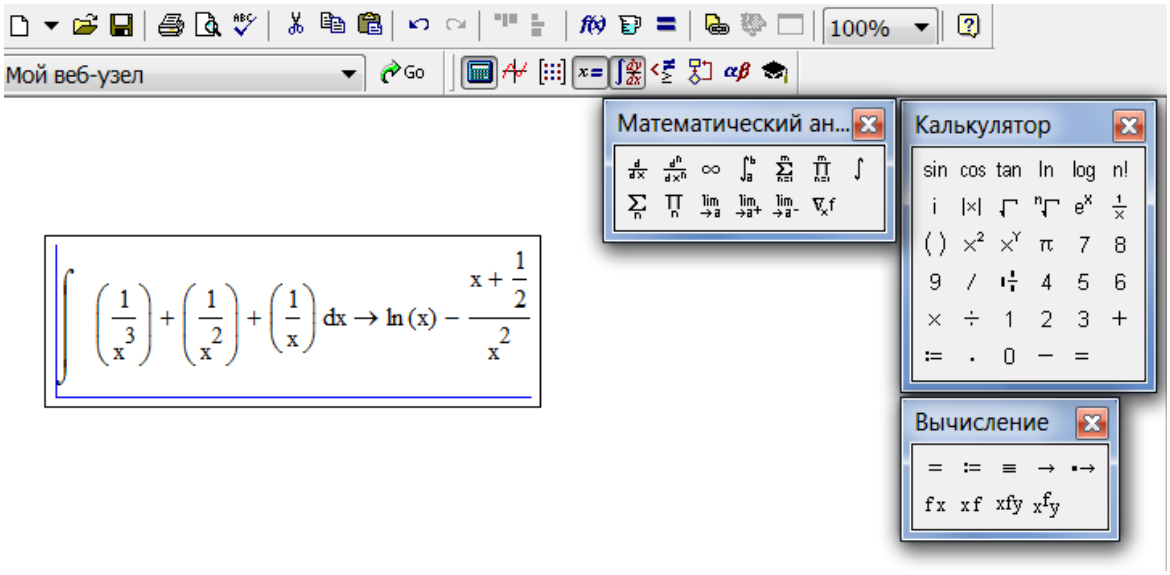
Rasm 10.13.

22) Aniqmas integralni hisoblang va natijani solishtiring:

23)

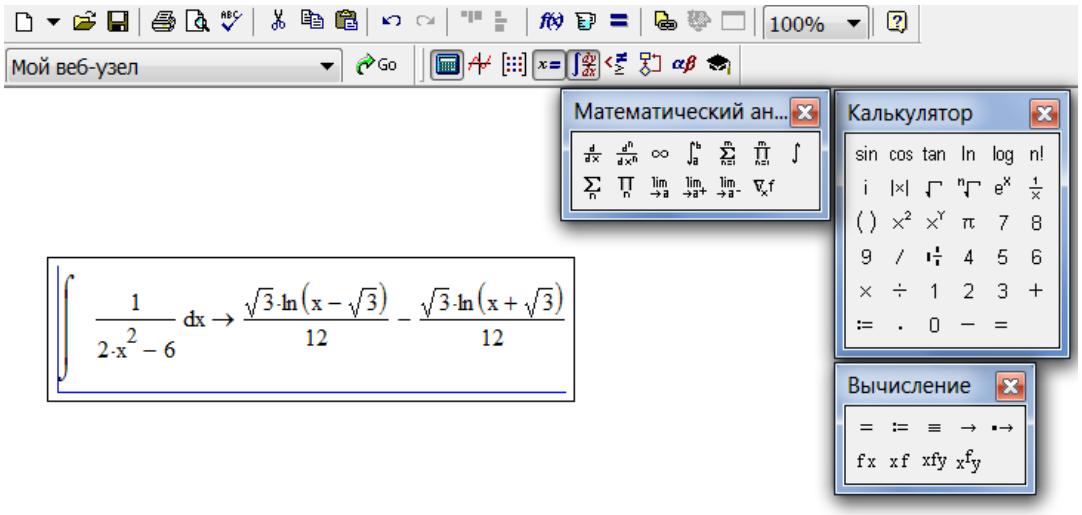
$$\int\left(\frac{1}{x^3}+\frac{1}{x^2}+\frac{1}{x}\right)dx \to \frac{-1}{(2x^2)}-\frac{1}{x}+\ln(x)\int\frac{1}{2x^2-6}\,dx \to \frac{-1}{6}\cdot\sqrt{3}\cdot a\tanh\left(\frac{1}{3}\cdot x\cdot\sqrt{3}\right)$$

Ushbu aniqmas integrallarni hisoblash uchun **Математические** panelidagi **Калькулятор, Вычисление** va **Математический анализ** paketlaridan foydalanamiz. So‘ng aniqmas integrallarni kiritib, quyidagi natijalarga ega bo‘lamiz:



$$\int \left(\frac{1}{x^3}\right) + \left(\frac{1}{x^2}\right) + \left(\frac{1}{x}\right) dx \rightarrow \ln(x) - \frac{x + \frac{1}{2}}{x^2}$$

Rasm 10.14.



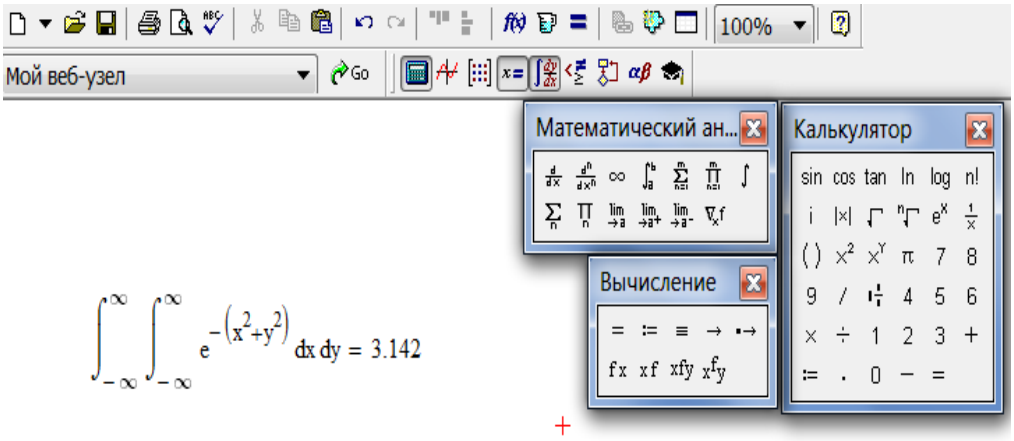
$$\int \frac{1}{2 \cdot x^2 - 6} dx \rightarrow \frac{\sqrt{3} \cdot \ln\left(x - \sqrt{3}\right)}{12} - \frac{\sqrt{3} \cdot \ln\left(x + \sqrt{3}\right)}{12}$$

Rasm 10.15.

24) Karrali integralni hisoblang va natijani solishtiring:

$$\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} e^{-\left(x^2+y^2\right)} dx\ dy = 3.142$$

Ushbu karrali integrallarni hisoblash uchun **Математические** panelidagi **Калькулятор, Вычисление,** va **Математический анализ** paketlaridan foydalanamiz. Ishchi sohaga karrali integralni kiritib, quyidagi natijani hosil qilamiz:


100%
Мой веб-узел
Go
Математический ан...
Калькулятор
sin cos tan ln log n!
Вычисление
$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-\left(x^2+y^2\right)}\,dx\,dy = 3.142$

Rasm 10.16.

II. MUSTAQIL TA’LIM MAVZULARI

Mustaqil ta’lim va mustaqil ishlar

Axborot texnologiyalari va jarayonlarning matematik modellashtirish bo‘yicha talabaning mustaqil talimi shu fanni organish jarayonining tarkibiy qismi bo‘lib, uslubiy va axborot resurslari bilan tola taminlangan.

Talabalar auditoriya mashgulotlarida professor-o‘qituvchilarining ma’ruzasini tinglaydilar. Auditoriyadan tashqarida talaba darslarga tayyorlanadi, adabiyotlarni konspekt qiladi, uy vazifa sifatida berilgan topshiriqlarga javoblarni topadilar. Bundan tashqari ayrim mavzularni kengroq organish maqsadida qoshimcha adabiyotlarni oqib referatlar tayyorlaydi hamda mavzu bo‘yicha testlar echadi. Mustaqil talim natijalari reyting tizimi asosida baholanadi.

Uyga vazifalarni bajarish, qoshimcha darslik va adabiyotlardan yangi bilimlarni mustaqil organish, kerakli malumotlarni izlash va ularni topish yollarini aniqlash, internet tarmoqlaridan foydalanib malumotlar toplash va ilmiy izlanishlar olib borish, ilmiy togarak doirasida yoki mustaqil ravishda ilmiy manbalardan foydalanib ilmiy maqola va maruzalar tayyorlash kabilar talabalarning darsda olgan bilimlarini chuqurlashtiradi,ularning mustaqil fikirlash va ijodiy qobiliyatini rivojlantiradi.Shuning uchun ham mustaqil talimsiz oquv faoliyati samarali bolishi mumkin emas.

Uy vazifalarni tekshirish va baholash amaliy mashgulot olib boruvchi oqituvchi tomonidan, laboratoriya ishlarini qabul qilish biriktirilgan oqituvchilar tomonidan har bir laboratoriya darsida baholanadi, konspektlarni va mavzuni ozlashtirish darajasini tekshirissh va baholassh esa maruza darslarini olib boruvchi oqituvchi tomonidan har darsda amalga oshiriladi. Axborot texnologiyalari va jarayonlarning matematik modellashtirish fanidan mustaqil ish majmuasi fanning barcha mavzularini qamrab olgan va quyidagi tartibda bajarish tartibi korsatilgan.

Mustaqil ishni bajarish tartibi.

1. Masalani mazmuni bilan tanishish.
2. Masalani yechishga qol keladigan adabiyotlarni organib chiqish.
3. Topshiriqni bajarish etaplarini belgilash. Ishni bajarishda optimal usullarni tanlash.
4. Topshiriqni bajarish.
5. Hisobot tayyorlash (referat tarzida yoki electron tarzida)

Tavsiya etiladigan mustaqil ta’lim mavzulari va hajmi.

№ t/r	Mustaqil ishlar mavzulari	Vazifa
1.	C++tili fanining C++ tilining arifmetik, qiymat uzatish va mantiqiy buyruqlari bo‘limi asosida elektron saxifa yaratish.	Adabiyot tanlash va mustaqil vazifani bajarish.
2.	C++ tili fanining C++ tilining konstruktsiyasi va dasturni translyatsiya qilish bo‘limi asosida elektron saxifa yaratish.	Adabiyot tanlash va mustaqil vazifani bajarish.
3.	C++ tili fanining Boshqarishni uzatish buyruqlari bo‘limi asosida elektron saxifa yaratish.	Adabiyot tanlash va mustaqil vazifani bajarish.
4.	Mathcad dasturi. Dastur interfeysi.	Adabiyot tanlash va mustaqil vazifani

		bajarish.
5.	Mathcad da hujjat yaratish Mathcadda oddiy hisoblashlarni bajarish.	Adabiyot tanlash va mustaqil vazifani bajarish.
6.	Dastur haqida umumiy ma’lumotlar Mathcadda ishlashning asosiy usullari.	Adabiyot tanlash va mustaqil vazifani bajarish.
7.	Mathcad dasturida o‘zgaruvchi va funksiyalarni aniqlash.	Adabiyot tanlash va mustaqil vazifani bajarish.
8.	Mathcadda Matn. Matnda formula. Matnni tahrirlash.	Adabiyot tanlash va mustaqil vazifani bajarish.
9.	Mathcadda grafika.Dekart grafikni yasash. Qutb koordinatalardagi grafiklar uchun funksiyalarni qo‘llash.	Adabiyot tanlash va mustaqil vazifani bajarish.
10	Mathcad paketida va elektron jadvallarda bir va ikki o‘lchamli funksiyalarning grafigini qurish.	Adabiyot tanlash va mustaqil vazifani bajarish.
11	Mathcadda simvolli xisoblash.	Adabiyot tanlash va mustaqil vazifani bajarish.
12.	Funksiyalarni berilgan oraliqdagi grafigini yasash. Ikki va uch o‘lchovli grafiklar.	Adabiyot tanlash va mustaqil vazifani bajarish.
13.	MS Acces dasturida forma va hisobot yaratish.	Adabiyot tanlash va mustaqil vazifani bajarish.
14.	Master va konstruktor rejimida ishlash. Bazaga ma’lumotlarni forma yordamida kiritish.	Adabiyot tanlash va mustaqil vazifani bajarish.
15.	Internet. Internet tarmog‘ining paydo bo‘lishi.	Adabiyot tanlash va mustaqil vazifani bajarish.
16.	Kompyuter tarmog‘i. Tarmoq turlari. Kompyuter tarmoqlarida ishlash asoslari.	Adabiyot tanlash va mustaqil vazifani bajarish.
17.	Tarmoq xizmatlari va axborotlarining servis markazlari.	Adabiyot tanlash va mustaqil vazifani bajarish.
18.	Kompyuterni tarmoqqa bog‘lash. TCP/IP protokoli.	Adabiyot tanlash va mustaqil vazifani bajarish.
19.	Kompyuterni tarmoqqa ulash va ishga sozlash.	Adabiyot tanlash va mustaqil vazifani bajarish.
20.	Axborot xavfsizligi. Axborotlarni himoyalash. Himoyalash usullari.	Adabiyot tanlash va mustaqil vazifani bajarish.
21.	Ma’lumotlar bazasini loyihalash.Ma’lumotlar bazasini boshqarish tizimi tushunchasi.	Adabiyot tanlash va mustaqil vazifani bajarish.
22.	MS Access dasturida MB ni yaratish. Relyatsion MB. yaratsh. Loyihalash.	Adabiyot tanlash va mustaqil vazifani bajarish.

23.	Ma’lumotlar bazasi tillari. SQL tili. Operatorlar. Ma’lumotlarni qayta ishlash. Jadvallarni birlashtirish.	Adabiyot tanlash va mustaqil vazifani bajarish.
24.	MS Acces dasturida forma va hisobot yaratish.	Adabiyot tanlash va mustaqil vazifani bajarish.
25.	MS Acces dasturida so‘rov (Запрос) yaratish.	Adabiyot tanlash va mustaqil vazifani bajarish.
26.	MS Acces dasturida SQL tili buyruqlarini qo‘llash.	Adabiyot tanlash va mustaqil vazifani bajarish.
27.	Ma’lumotlar bazasini boshqarish tizimida SQL tilida so‘rovlar buyruqlarni qo‘llab avtomobillarga jadvallar va turli xil so‘rovlar yarating va kompyuterda saklang.	Adabiyot tanlash va mustaqil vazifani bajarish.
28.	Ma’lumotlar bazasini boshqarish tizimida SQL tilida со‘ровлар buyruqlarni qo‘llab dori darmonlarga jadvallar va turli xil so‘rovlar yarating va kompyuterda saklang.	Adabiyot tanlash va mustaqil vazifani bajarish.

III. TARQATMA MATERIALLAR

I SEMESTR. ЛАБОРАТОРИЯ TOPSHIRIQ VARIANTLARI.

Laboratoriya ishi №1.Fayl va katologlar bilan ishlash. Axborot o‘lchovi boyicha masalalar yechish.

1–Variant

1. Disk turlari va ularning vazifasi
2. Lazerli printer va uning turlari
3. Mikroprotsessor va uning turlari hamda o‘lchamlari
4. Operativ xotira va uning hajmi
5. Xab(hub) qurilmasi va uning vazifasi

2–Variant

1. Qattiq disk(vinchester) va uning hajmi
2. Sichqoncha va uning tugmachalari vazifalari
3. Kesh-xotira va uning vazifasi
4. 5,25 va 3,5 dyumli disketalar va ularning vazifasi hamda hajmi
5. Klaviatura, uning turlari va asosiy tugmachalari vazifasi

3–**Variant**

1. Disk yurituvchilar va ularning vazifasi, turlari
2. Port tushunchasi
3. Ma’lumot o‘lchami birliklari
4. Kompyuterning qo‘shimcha qurilmalari nimalardan iborat va ularning vazifalari
5. Flesh disk tushunchasi va uning hajmi

4–Variant

1. Monitor vazifasi va uning turlari
2. Kesh xotira va uning vazifasi
3. Kompakt disk yurituvchilar vazifasi va uning turlari
4. Kompakt disklar va ularning turlari
5. Portlar to‘g’risida ma’lumot bering

5–Variant

1. Klaviatura vazifasi va uning turlari
2. Qattiq disk o‘lchami va uni bo‘laklarga ajratish
3. Ishchi(taktovaya) chastota nima?
4. Printer vazifasi va uning turlari
5. Kompakt disklar va ularning turlari hamda hajmi

6–Variant

1. Skaner vazifasi va turlari
2. UPS qurilmasi va uning vazifasi
3. Kompyuter turlari
4. Plotter va uning vazifasi
5. Klaviatura vazifasi va uning turlari

7–**Variant**

1. Modem qurilmasi, uning turlari hamda vazifasi
2. Kompyuterni o‘chirish tartibi
3. Tizimli blok va uning tarkibidagi qurilmalarni vazifalari
4. Strimer va uning vazifasi

5. Kompyuterni ishga tushirish tartibi

8–Variant

1. Sichqoncha qurilmasi, uning chap va o‘ng tugmachalari vazifalari
2. Strimer va uning vazifasi
3. Skaner, uning turlari va vazifasi
4. Doimiy xotira to‘g’risida tushuncha
5. Disk turlari va vazifalari

9–Variant

1. Kompyuter turlari
2. Kesh xotira va uning vazifasi
3. Faks-modem va uning vazifasi
4. Mikroprotsessor vazifasi va uning turlari
5. Kompyuterning asosiy qurilmalari nimalardan iborat va ularning vazifalari.

10–Variant

1. Kompakt disk uchun disk yurituvchilar va ularning turlari
2. Printerlar va ularning turlari va chop qilish tezligi
3. Modem, uning vazifasi hamda turlari
4. Kompakt disklar va ularning turlari
5. Ma’lumot o‘lchami birliklari

11–Variant

1. Videoxotira to‘g’risida tushuncha
2. Materinskaya plata to‘g’risida tushuncha
3. Mikroprotsessor, uning turlari va vazifasi
4. Plotter va uning vazifasi
5. Doimiy xotira to‘g’risida tushuncha

12–Variant

1. Shaxsiy kompyuterlarning yaratilish tarixi
2. Skaner, uning turlari va vazifasi
3. Kompyuterning asosiy qurilmalari nimalardan iborat va ularning vazifalari.
4. Kesh-xotira vazifasi va o‘lchami
5. Modem, uning turlari va vazifasi

13–Variant

1. Kompyuterni o‘chirish tartibi
2. Printer, uning turlari va vazifasi
3. Flesh-disk nima?
4. Kompyuter bilan ishlashda texnika xavfsizligiga rioya qilish qoidalari
5. Monitor, uning turlari va vazifasi

14–Variant

1. Kompyuterni ishga tushirish tartibi
2. Klaviatura, uning turlari va vazifasi
3. Skaner va uning vazifasi
4. Ishchi(taktovaya) chastota tushunchasi
5. Mikroprotsessor, uning vazifasi va turlari

15–Variant

1. Shaxsiy kompyuterlarning yaratilish tarixi
2. Monitor, uning turlari va vazifasi
3. Kompyuter turlari
4. Kompyuterning qo‘shimcha qurilmalari nimalardan iborat va

ularning vazifalari
5. Ovozli xarita nima?

16–Variant

1. Skaner vazifasi va turlari
2. UPS qurilmasi va uning vazifasi
3. Kesh-xotira vazifasi va o‘lchami
4. Plotter va uning vazifasi
5. Skaner va uning vazifasi

17–Variant

1. Kompakt disklar va ularning turlari
2. UPS qurilmasi va uning vazifasi
3. Modem, uning vazifasi hamda turlari
4. Plotter va uning vazifasi
5. Videoxotira to‘g’risida tushuncha

18–Variant

1. Flesh-disk nima?
2. Kesh-xotira vazifasi va o‘lchami
3. Kompyuter turlari
4. Plotter va uning vazifasi
5. Strimer va uning vazifasi

19–Variant

1. Klaviatura vazifasi va uning turlari
2. UPS qurilmasi va uning vazifasi
3. Kompyuter turlari
4. Plotter va uning vazifasi
5. Skaner vazifasi va turlari

20–**Variant**

1. Kesh-xotira vazifasi va o‘lchami
2. Materinskaya plata to‘g’risida tushuncha
3. Printerlar va ularning turlari va chop qilish tezligi
4. Plotter va uning vazifasi
5. Kompyuter-Bloknotlar turlari

21–Variant

1. Skaner vazifasi va turlari
2. Cho‘ntak Kompyuterlari turlari
3. Videoxotira to‘g’risida tushuncha
4. Elektron Kotiblar xaqida nimalar bilasiz?
5. Klaviatura vazifasi va uning turlari

22–Variant

1. Elektron yozuv daftarchalari
2. Matritsali printerlar
3. Lazerli kompakt disklar
4. Plotter va uning vazifasi
5. Klaviatura vazifasi va uning turlari

23–Variant

1. Purkovchi printer vazifasi
2. UPS qurilmasi va uning
3. Kompyuter turlari
4. Plotter va uning vazifasi
5. Audioadapter

24–Variant

1. Lazerli printer vazifasi
2. Bit-bayt-fayl-katalog- mantiqiy disk
3. Drayverlar
4. Plotter va uning vazifasi
5. Klaviatura vazifasi va uning turlari

25–Variant

1. UNIX xaqida nimalar bilasiz?
2. Modem, uning turlari va vazifasi
3. O‘tilitlar
4. Plotter va uning vazifasi
5. Elektron yozuv daftarchalari

26–Variant

1. Kompyuterli nashriyot faoliyati
2. Kompilyator va Interpretatorlar
3. Diskli jamlagichlarning qanday turlari
4. Plotter va uning vazifasi
5. Klaviatura vazifasi va uning turlari

27–Variant

1. Multimedia dasturiy vositalari
2. UPS qurilmasi va uning vazifasi
3. Modem va faks-modemlar
4. Plotter va uning vazifasi
5. Klaviatura vazifasi va uning turlari

28–Variant

1. Sun’iy intellekt tizimlari
2. UPS qurilmasi va uning vazifasi
3. Axborotning qanday o‘lchov birliklari
4. Plotter va uning vazifasi
5. Klaviatura vazifasi va uning turlari

29–Variant

1. Skaner vazifasi va turlari
2. Drayverlar
3. Bit-bayt-fayl-katalog- mantiqiy disk
4. Plotter va uning vazifasi
5. Klaviatura vazifasi va uning turlari

30–Variant

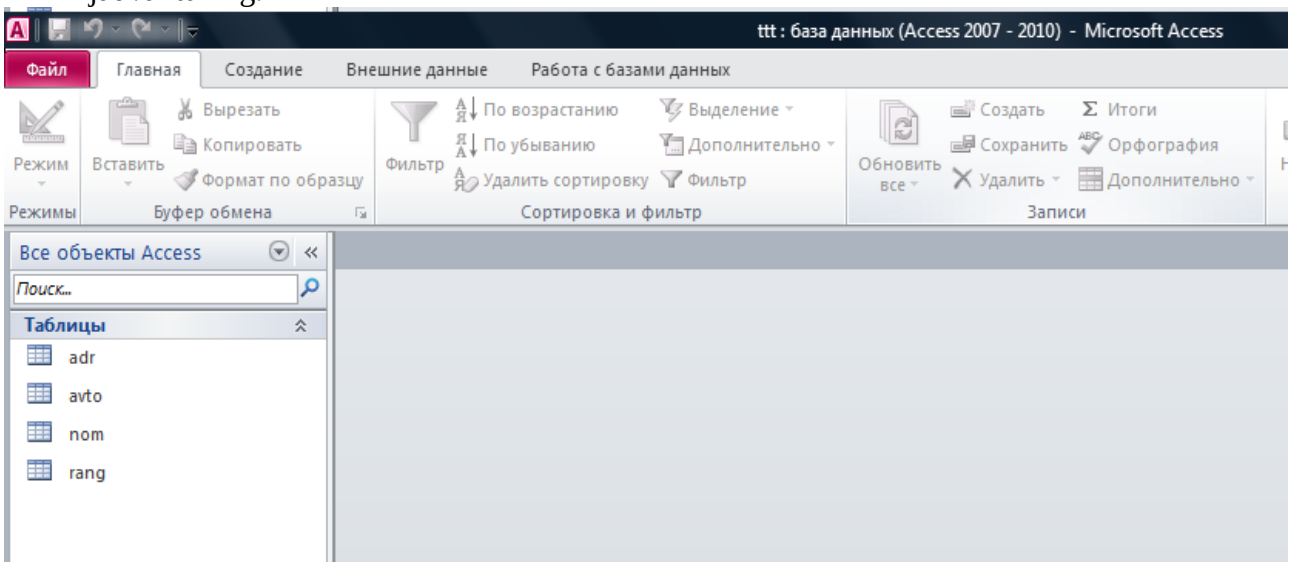
1. Case-Texnologiyalar
2. SATA qurilmasi va uning vazifasi
3. Kompyuter turlari

4. Plotter va uning vazifasi
5. Sichqoncha vazifasi va uning turlari

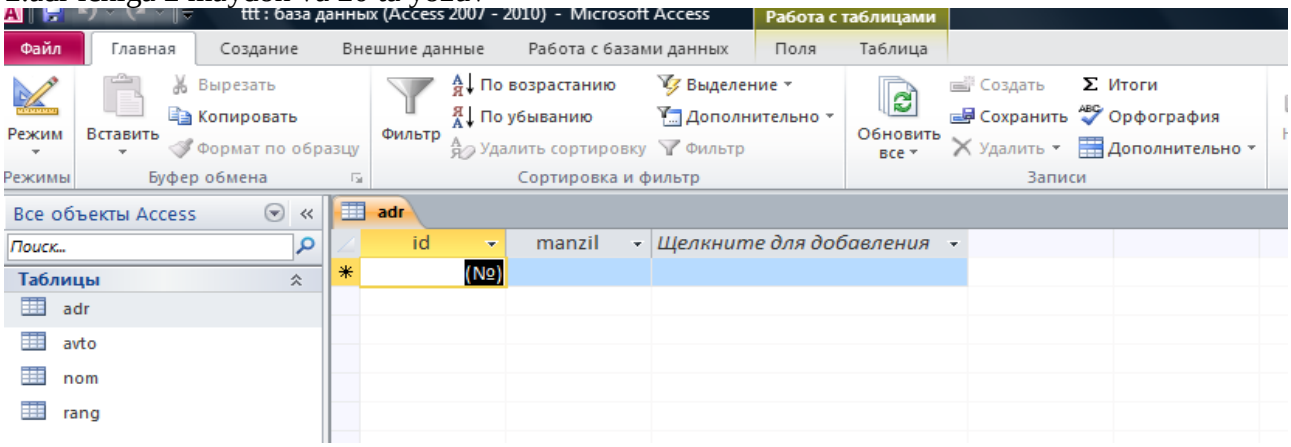
Laboratoriya ishi №2.Ma'lumotlar bazasini Access 2010da yaratish. Access2010da jadvallar yaratish operatorlari. Access2010da so'rovnoma yaratish.

Quyidagi avtomobillar boyicha malumot bazasini loyihalang:

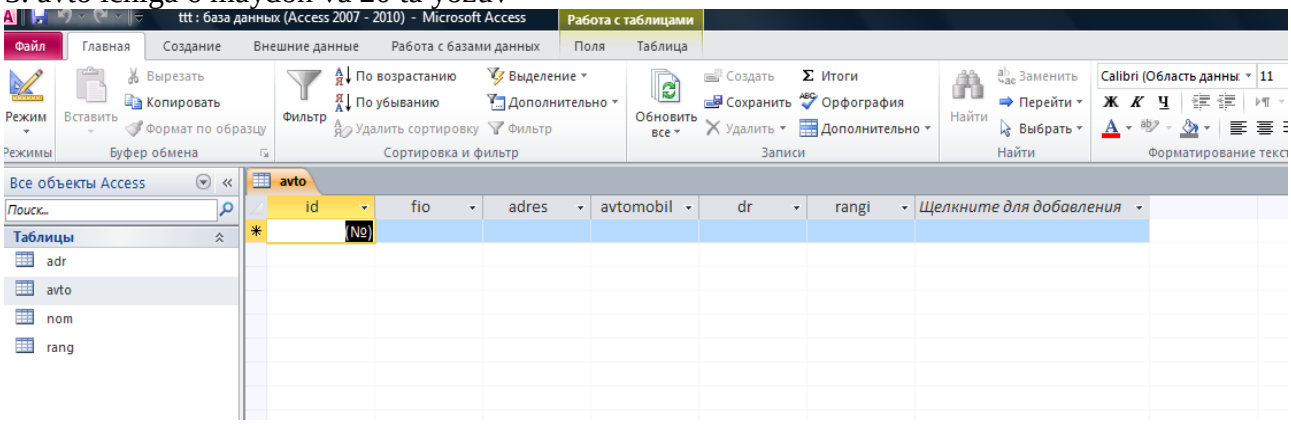
1.4 та jadval tuzing.



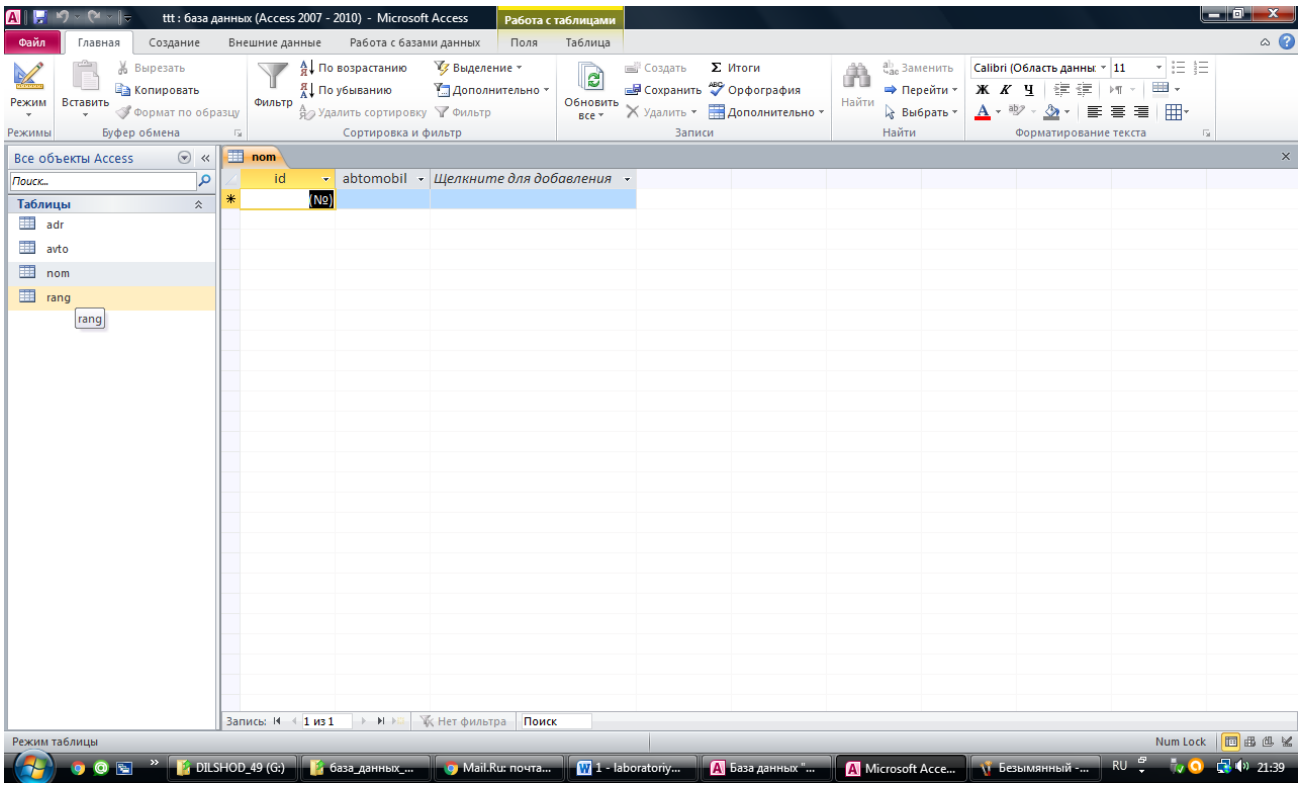
2.adr ichiga 2 maydon va 20 ta yozuv



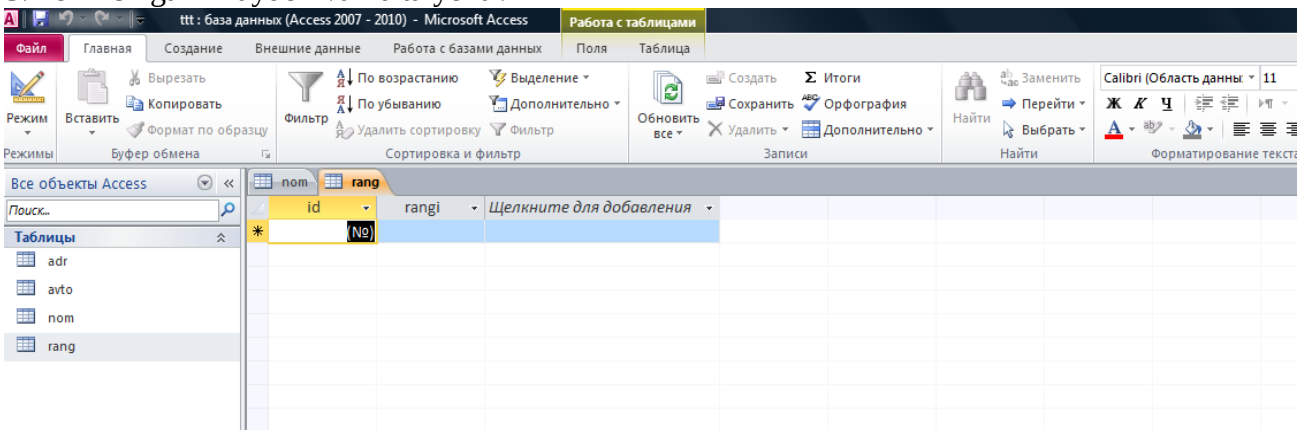
3. avto ichiga 6 maydon va 20 ta yozuv



4. nom ichiga 2 maydon va 20 ta yozuv



5. nom ichiga 2 maydon va 20 ta yozuv



Topshiriq variantlari

1. Atomobil
2. Sport
3. Miliy taomlar
4. Dori darmon
5. Moda
6. Gullar
7. Xayvonlar
8. Adabiyot
9. Sa’nat
10. Kompyuter qurilmalari
11. Dekanat
12. Yo‘l qurilish soxasi
13. Er usti transport tizimlari
14. Chinni idish
15. Meditsina
16. Tabiyot

17. Muzey
18. Paxta
19. Avtomobil transporti
20. Iqtisodiyot
21. Pishiriqlar
22. Sanatkorlar
23. Sabzavotlar
24. Mevalar
25. Tarmoq
26. Tarixiy obidalar
27. Avtoservis
28. Asaka zavodi
29. O‘zbekiston shaharlari
30. Toshkent tumanlari

Laboratoriya ishi №3.Access2010da shakllar yaratish. Ms Access2010da hisobotlar yaratish.

1. Atomobil
2. Sport
3. Miliy taomlar
4. Dori darmon
5. Moda
6. Gullar
7. Xayvonlar
8. Adabiyot
9. Sa’nat
10. Kompyuter qurilmalari
11. Dekanat
12. Yo‘l qurilish soxasi
13. Er usti transport tizimlari
14. Chinni idish
15. Meditsina
16. Tabiyot
17. Muzey
18. Paxta
19. Avtomobil transporti
20. Iqtisodiyot
21. Pishiriqlar
22. Sanatkorlar
23. Sabzavotlar
24. Mevalar
25. Tarmoq
26. Tarixiy obidalar
27. Avtoservis
28. Asaka zavodi
29. O‘zbekiston shaharlari
30. Toshkent tumanlari

Laboratoriya ishi №4.Access2010da SQL tilini so‘rov yaratish buyruqlari.

T.R.	OPERATOR TURI	CO‘ROV SONI (MIN)	QISQA MAZMUNI
1	INSERT INTO	3	turli tipdagi va bir nechta yozuvlarni qo‘shish
2	SELECT	5	cheklangan sondagi yozuvlari chiqarish
3	DELETE	2	shart orqali o‘chirish, hammasini o‘chirish
4	UPDATE	3	turli tipdagi va bir nechta yozuvlarni hamda
5	MATEMATIK AMALLAR	2	kamida ikkitasi birga bo‘lsin
6	MUNOSABAT AMALLAR	3	kamida ikkitasi birga bo‘lsin
7	MANTIQIY AMALLAR	2	kamida ikkitasi birga bo‘lsin
8	ARRALASH	2	
9	DISTINCT	2	
10	WHERE	2	
11	BETWEEN	2	
12	IN	2	
13	LIKE	4	faqat boshidan, oxiridan, ixtiyoriy joydan
14	ISNULL	2	not bilan ham
15	NOT	3	murakkab amallar bilan
16	ORDER BY	2	hamma Topshiriqlar uchun
17	HAVING	2	
18	MAX	1	
19	MIN	1	
20	COUNT	1	
21	SUM	1	
22	COUNT(*)	1	
23	AVG	1	
24	ARRALASH	3	
25	YORDAMCHI SO‘ROVLAR	3	kamida 3 ta statik funksiyalar, amallar, operatorlardan foydalang
26	IN	2	
27	EXISTS	2	
28	ANY	2	
29	ALL	2	
30	CAST	1	
31	CONVERT	2	
32	CASE	3	
33	COALESCE	1	
34	NULLIF	1	
35	ODDIY	2	barcha Topshiriqlar
36	INNER JOIN	2	
37	LEFT OUTER JOIN	2	
38	RIGHT OUTER JOIN	2	

39	FULL OUTER JOIN	2	barcha Topshiriqlar
40	CROSS JOIN	2	
41	UNION	2	

1. Atomobil
2. Sport
3. Miliy taomlar
4. Dori darmon
5. Moda
6. Gullar
7. Xayvonlar
8. Adabiyot
9. Sa’nat
10. Kompyuter qurilmalari
11. Dekanat
12. Yo‘l qurilish soxasi
13. Er usti transport tizimlari
14. Chinni idish
15. Meditsina
16. Tabiyot
17. Muzey
18. Paxta
19. Avtomobil transporti
20. Iqtisodiyot
21. Pishiriqlar
22. Sanatkorlar
23. Sabzavotlar
24. Mevalar
25. Tarmoq
26. Tarixiy obidalar
27. Avtoservis
28. Asaka zavodi
29. O‘zbekiston shaharlari
30. Toshkent tumanlari

Laboratoriya ishi №5.Kompyuter tarmoqlari va topologiyalari.

1. /D diskda o‘z papkangizni yarating.
2. Lokal tarmoq orqali: 172.16.4.134 –BIK–2SEM–3 lab papkasidan topshiriq oling va bajaring.
3.Ishchi kompyuterizni lokal tarmoqqa ulanish xaqidagi ma’lumotni , server 172.16.4.134 –3 papkasiga tarmoq orqali kiriting va saqlang.
4. Internet Explorer dasturini ishga tushiring.
5. Internet qidiruv tizimiga kiring.
6. O‘zbekistonda suv xo‘jaligi holati va suv xo‘jaligida zamonaviy boshqaruv tizimlarini qo‘llashga oid ma’lumotlar yig’ing.
7. Ma’lumotlardan nusxa oling va o‘z papkangizga ko‘chiring.
8. Internet Explorer dasturini ishga tushiring.
9. Variantingizga oid Internet qidiruv tizimiga kiring.

Variantlar:

a) www.google.uz., www.naytov.com (O‘zbekistonda joylashgan qidiruv tizimlari);
b) www.rambler.ru,
c) www.aport.ru,

d) www.yandex.ru,
f) www.mail.ru, (Rossiyada joylashgan qidiruv tizimlari);
h) www.altavista.com,
i) www.yahoo.com (AQshda joylashgan qidiruv tizimlari).
10. www.nigma.ru qidiruv tizimida quyida keltirilgan mavzularda ma'lumotlar qidiring.
- ✓ Avtomobil Yo'llarining xalq xujaligidagi axamiyati
- ✓ O'zbekiston Respublikasi avtomobil yo'llari to'g'risidagi qonun
- ✓ Avtomobil yo'llarini tasniflanishi
- ✓ Avtomobil yo'llari elementlari
- ✓ Avtomobil yo'llarini bo'ylama va ko'ndalang kesimlari
- ✓ Avtomobil yo'llarida kichik suv inshootlarini joylashishi
- ✓ Suv o'tkazuvchi inshootlarning asosiy turlari
- ✓ Atmosfera va yer osti suvlarini yo'ldan chetlatish
- ✓ Transport oqimi xarakat qonuniyatlari
- ✓ Avtomobil g'ildiragidan yo'l to'shamasiga ta'sir etuvchi kuchlar

11. «Kompyuter tarmoqlari va topologiyalari.» mavzusiga oid ma'lumot izlang:
1. O'z shaxsiy elektron adresingizni oching.
2. Elektron adresingizdagi parolingizni saqlang va doimo yodda tuting.
3. O'z gruppadoshlaringiz bilan xat yozishing.
4. Laboratoriya ishni rasmiylashtiring.
5. Yuqorida keltirilgan berilgan variantlaringizga oid qidiruv serveriga kiring.
6. Quyida keltirilgan mavzular bo`yicha ma'lumot izlang, o'z papkangizda saqlang.
- ✓ Yo'l to'shamasi konstruktsiyalari turlari
- ✓ Yo'l to'shamalarini qurishni tashkil etish va qurish
- ✓ Avtomobil yo'llarini bir satxda kesishuvi. Xalqali chorraxalar
- ✓ Avtomobil yo'llarining xar xil satxda kesishuvchi turlari
- ✓ Avtomagistrallarni loyihalash xususiyatlari
- ✓ Avtomobil yo'llarini ta'mirlash va saqlash ishlari tasnifi.
- ✓ Avtomobil yo'llarini ta'mirlash va saqlash ishlarini rejalashtirish va ularni tashkil qilish.
- ✓ Avtomobil yo'llarini ta'mirlash va saqlash xizmatining vazifalari.
- ✓ Xarakat xavfsizligini ta'minlash.

7. Ma'lumotlaringizni www.inf-at@yandex.ru nomli elektron adresga xat orqali jo'nating.
8. Xatga Internetdan rasm, musiqa biriktiring.
11. Ma'lumotlardan nusxa oling va o'z papkangizga ko'chiring.
12. Laboratoriya ishni rasmiylashtiring.

Laboratoriya ishi № 6.Лаборатория topshiriq variantlari. C++ algoritmik tilning chiziqli operatorlar. Dasturlari bilan ishlash.

BERILGAN FUNKTSIYALARNING QIYMATINING HISOBLASH ALGORITMI VA DASTURINI TUZING.

1. Laboaratoriya ishini bajarish uchun topshiriq variantlari.Qoyidagi ifodalar qiymatini hisoblash algoritmi va dasturi tuzilsin.

1–variant

M. 12.11 r=20cm t=5c S=20sinπt v=? a=?

2–variant

M. 12.24 x=αt y=βt-$\frac{gt^2}{2}$ $a_\tau = ?$ $b_n = ?$

3–variant

M. 12.17 x=20t-sin20t , y= 1-cos20t t=0 a=? ρ=?

4-12–variant

M. 11. 7 M. 11.4 M. 10.9 M. 10.12 M. 10.13
M. 10.15 M. 10.16 M. 10.17 M. 10.20

13–variant

$k = c\,tg\,\frac{x-4}{0{,}6y} + \ln e^{0{,}5xy} - \sqrt[3]{x-0{,}15}$

бу ерда $x = 1{,}8;\quad y = 1{,}35.$

14–variant

$w = s\,in^2\,\frac{x^3}{2{,}65} + \ell n arctg^2 x^2 - 3{,}5\sqrt{x}$

бу ерда $x = 0{,}168.$

15–variant

$y = \arcsin x + 0{,}69 \cdot a \cdot tg^3 x - 2^{\sqrt{x+0{,}4}}$

бу ерда $x = 0{,}6;\quad a = 5.$

16–variant

$h = 4{,}5^a - \cos 2x^2 - \frac{8{,}46 \cdot c}{5^{a-c}} + ctg\ \ell n^2 x$

бу ерда $x = 0{,}6;\quad a = 2{,}5;\quad c = 1{,}96.$

17–variant

$p = \ell n\, e^x - \frac{\sqrt[3]{x+4}}{e^{x-5}} + \cos\frac{2x}{y}$

$y = \sin x$

бу ерда $x = 0{,}159.$

18–variant

$y = e^{\sqrt{2x+5}} + \frac{\ell n e^{x-5}}{|x-5|} - 3\sin x$

бу ерда $x = 0{,}695.$

19–variant

$y = e^{\sqrt{x+Sinx}} + \ell n x^3 + arctgx^2$

$x = 5z$

бу ерда $z = 3{,}5.$

20–variant

$$z = ctg\ \sin x^2 + \frac{0{,}55xy}{e^{\,x}} + \sqrt{x + y^2}$$

$y = e^{\,x+5}$

бу ерда $x = 0{,}5.$

21–variant

$$y = e^{\,arctgx} + \ell nctg^2 x - \frac{0{,}65x}{|\,x \cdot z\,|}$$

бу ерда $x = 0{,}67\,;\ z = -5.$

22–variant

$$a = 3^{\,x} + \frac{b+c}{c+d} + \ell n(x+b) + e^{\,c+e}$$

$x = b \cdot c \cdot d$

бу ерда $b = 3\,;\quad c = 4\,;\quad d = 5\,.$

23–variant

$$y = e^{\arcsin x} - 2^{\,a+b} - \sqrt[3]{x + 5ab}$$

$a = x + b$

бу ерда $x = 0{,}5;\quad b = 3{,}9.$

24–variant

$$w = e^{\,\ell n^2 x} - \sin 2{,}5x + \frac{|\,x - 5\,|}{\sqrt{x}}$$

$x = ctgz$

бу ерда $z = 0{,}36.$

25–variant

$$y = s\,in\,\frac{x-5}{0{,}6x} + \ell narctgx + \frac{\sqrt{|\,x - 5 \cdot a\,|}}{0{,}7x}$$

бу ерда $x = 0{,}75\,;\quad a = -0{,}1.$

Laboratoriya ishi №7.C++ algoritmik tilning tarmoqlanish operatorlar. Dasturlari bilan ishlash.

1–variant

$$y = \begin{cases} e^{\,\ell n^2 x}\,, & agar \quad x > 1 \\ arctg\,\dfrac{2x}{z}\,, & agar \quad x = 1 \qquad bu\ erda \quad z = 5. \\ \sqrt{|\,x - 0{,}5z\,|}\,, & agar \quad x < 1 \end{cases}$$

2–variant

$$z=\begin{cases}\sqrt{2x^3+3\ln 5x}\ , & agar \quad x>0\\ 2^{x-5}-\sin^2 x\ , & agar \quad x=0\\ arc\sin x^2\ , & agar \quad x<0\end{cases}$$

3–variant

$$y=\begin{cases}ctg^2x+\sqrt[3]{x+1}\ , & agar \quad x>0\\ |x^3-e^{ctgx}|\ , & agar \quad x=0\\ ln|x+0{,}5|\ , & agar \quad x<0\end{cases}$$

4–variant

$$z=\begin{cases}\ell n\,2{,}6x+4{,}5ctg^2x, & agar \quad x>0{,}5\\ sin^2x+\sqrt{x+0{,}6}\ , & agar \quad x=0{,}5\\ sin(x+0{,}5x^2+a\cdot b\cdot c), & agar \quad x<0{,}5\end{cases}$$

$bu\ erda \quad a=5; \quad b=-0{,}6; \quad c=-7.$

5–variant

$$y=\begin{cases}4{,}3^{0{,}2x}\cdot sin\sqrt{x}\ , & agar \quad x>1\\ 4{,}17\cdot arctg|x-5|\ , & agar \quad x=1\\ ctg\left(x+0{,}16\right)\ , & agar \quad x<1\end{cases}$$

6–variant

$$y=\begin{cases}\ell n^2x^2+\dfrac{0{,}6x}{\sqrt{x+0{,}5}}\ , & agar \quad x>1\\ (x+2)^2+ctg|x-3|, & agar \quad x=1\\ \sqrt[3]{|x+\sin x|}\ , & agar \quad x<1\end{cases}$$

7–variant

$$z=\begin{cases}\ell n|arctgx+0{,}7|\ , & agar \quad x>0\\ arcsinx\ , & agar \quad x=0\\ e^{arctgx}\ , & agar \quad x<0\end{cases}$$

8–variant

$$z=\begin{cases}x^{\alpha}+e^{x-5}+ctg3x\ , & agar \quad x>0{,}6\\ 4{,}14\cdot ctg^2x^3\ , & agar \quad x=0{,}6\\ \dfrac{x+1}{\sqrt{|x|}}\ , & agar \quad x<0{,}6\end{cases}$$

$bu \quad erda \quad \alpha=5.$

9–variant

$$y=\begin{cases} 2{,}6^{\ell nx}-sin\sqrt{x} \quad , \quad agar \quad x>0{,}8 \\ a^{2x-\sqrt{b}}-arccosx \quad , agar \quad x=0{,}8 \\ \cos 2x+|x-a\cdot b| \quad , agar \quad x<0{,}8 \end{cases}$$

$bu \quad erda \quad a=5; \quad b=4.$

10–variant

$$y=\begin{cases} 2^{x+7}-0{,}5\ln(x+1) \quad , \quad agar \quad x>1 \\ e^{arctgx}-5x^2 \quad , \quad agar \quad x=1 \\ \dfrac{x-5}{2}+tg|x-3| \quad , \quad agar \quad x<1 \end{cases}$$

11–variant

$$y=\begin{cases} sin(\ell n|x|)+\sqrt[3]{x+5} \quad , \quad agar \quad x>1 \\ 0{,}6\cos 2x+4{,}8^a \quad , \quad agar \quad x=1 \\ a^2-e^x+|x|+\ell n^2 x \quad , \quad agar \quad x<1 \end{cases}$$

$bu \quad erda \quad a=5{,}6.$

12–variant

$$y=\begin{cases} 4{,}3^2\cdot ctg\sqrt{x}+e^{5x} \quad , \quad agar \quad x>1 \\ \sqrt[3]{x^2+5} \quad , \quad agar \quad x=1 \\ 2x+arctgx^2 \quad , \quad agar \quad x<0 \end{cases}$$

13–variant

$$y=\begin{cases} x^2+4x-\pi\cdot x \quad , \quad agar \quad x<0 \\ (x^2+4)^2-\sqrt{x^2+0{,}36} \quad , \quad agar \quad 0\le x\le 1 \\ x\cdot(x^2+3)+\ell n^2(\pi+x) \quad , \quad agar \quad x>1 \end{cases}$$

14–variant

$$y=\begin{cases} e^{x+0{,}6}-|x-5| \quad , \quad agar \quad x\ge 5 \\ \ell n^2\left(1+\dfrac{1}{x}\right) \quad , \quad agar \quad 0<x<5 \\ ctg\,x+tgx \quad , \quad agar \quad x\le 0 \end{cases}$$

15–variant

$$y=\begin{cases} e^{\ell n^2 x}-tg^2\dfrac{x}{0{,}5} \quad , \quad agar \quad x=1{,}2 \\ \sqrt{3x^2+9{,}36x+5} \quad , \quad agar \quad x>1{,}2 \\ \ell n|4x-8{,}16| \quad , \quad agar \quad x<1{,}2 \end{cases}$$

16–variant

$$w=\begin{cases} e^{arctgx^2}+\sqrt{x^2+1} \quad , \quad agar \quad x\ge 0{,}68 \\ \sqrt{x^2+\ell nx} \quad , \quad agar \quad 0<x<0{,}68 \\ ctg\,6x+5\,\ell n|x| \quad , \quad agar \quad x\le 0 \end{cases}$$

17–variant

$$y=\begin{cases} cos^3x \quad , \quad agar \quad |x|<\dfrac{\pi}{2} \\ 1-e^{cosx} \quad , \quad agar \quad |x|>\dfrac{\pi}{2} \\ sin^2x \quad , \quad agar \quad |x|=\dfrac{\pi}{2} \end{cases}$$

18–variant

$$y=\begin{cases} a^{2x-1}-arccosx \quad , \quad agar \quad x<1 \\ sin\cdot\ell n(x^2+1) \quad , \quad agar \quad x=1 \\ \sqrt[4]{|x+5|} \quad , \quad agar \quad x>1 \end{cases}$$

bu erda $a=5.$

19–variant

$$y=\begin{cases} \sqrt{2x+5{,}46}+e^{sinx} \quad , \quad agar \quad x>1 \\ \ell n\,sin(x^3+1) \quad , \quad agar \quad x=1 \\ e^{x+t}+|x+t| \quad , \quad agar \quad x<1 \end{cases}$$

bu erda $t=-0{,}5.$

20–variant

$$y=\begin{cases} sin^2x+|x-1|+2\cdot\sqrt{xs} \quad , \quad agar \quad x>1{,}5 \\ \sqrt{3a-2bx+x^2} \quad , \quad agar \quad x=1{,}5 \\ e^{arctgx} \quad , \quad agar \quad x<1{,}5 \end{cases}$$

bu erda $a=10;\quad b=1{,}5.$

21–variant

$$y=\begin{cases} ctg\dfrac{3x}{5}+e^{\sqrt{tgx}} \quad , \quad agar \quad x>2{,}5 \\ \ell n2x^3+\sqrt{x+1}\,, \quad agar \quad x=2{,}5 \\ |x^3-ctg\,x| \quad , \quad agar \quad x<2{,}5 \end{cases}$$

22–variant

$$z=\begin{cases} arctg\,x^2+e^{tgx}, & agar \quad x>0 \\ sinx+\ell n|x+5|, & agar \quad x<0 \\ cos\,(x+4{,}5a), & agar \quad x=0 \end{cases}$$

$bu \quad erda \quad a=-0{,}5.$

23–variant

$$q=\begin{cases} 2tg\,x^2+e^{sinx}, & agar \quad 0\le x\le 1 \\ 4ctg\,2x+\ell n\,2{,}6x, & agar \quad x>1 \\ arcctg\,x, & agar \quad x<0 \end{cases}$$

24–variant

$$p=\begin{cases} \sqrt{x^2+3\ell n5x}, & agar \quad x>6{,}139 \\ |x^2+5x-5|, & agar \quad x<-1{,}5 \\ \dfrac{|x-8{,}16|}{x+4}-5x, & agar \quad -1{,}5\le x\le 6{,}139 \end{cases}$$

25–variant

$$y=\begin{cases} \sqrt{x}+\cos x+0{,}5\cdot x^2, & agar \quad x>1{,}5 \\ b\cdot e^{x+9}-\cos x, & agar \quad 0\le x\le 1{,}5 \\ tgx^2+x^{a+b}-x^2, & agar \quad x<1{,}5 \end{cases}$$

$bu \quad erda \quad \alpha=3; \quad b=-5.$

26–variant

$$Y_2=\begin{cases} 10+x_1^2 & x_1=\sin x_2 \\ e^{x_3} & x_1>\sin x_2 \\ (6-x_4)^2-22 & x_1<\sin x_2 \end{cases}$$

x_1=-19,54 x_2=-1,938 x_3=18,11 x_4=2,804

27–variant

$$Y_3=\begin{cases} \arcsin 0{,}47 & \cos 84^\circ > x_2 \\ 1 & \cos 84^\circ = x_2 \\ 2{,}71x_3 & \cos 84^\circ < x_2 \end{cases}$$

x_2=-1,938 x_3=18,11

28–variant

$$Z_1=\begin{cases} 2,71-4x_4^2 & \ln|x_1-2|<x_2 \\ 2,71+4x_4^2 & \ln|x_1-2|>x_2 \\ x_4^3+22,8x_4^2 & \ln|x_1-2|=x_2 \end{cases}$$

x_1=-19,54 x_2=-1,938 x_4=2,804

29–variant

$$Z_3=\begin{cases} \sin 37^\circ-2x & 3x_2<e^{x_1} \\ \cos\dfrac{\pi}{8}+x & 3x_2=e^{x_1} \\ 6x_3-3,07 & 3x_2>e^{x_1} \end{cases}$$

x=41,3 x_1=-19,54 x_2=-1,938 x_3=18,11

30–variant

$$Z_2=\begin{cases} \sqrt{x_1^2+x_2^2} & \ln 13=x \\ \sqrt[3]{x_1^2+x_2^2} & \ln 13<x \\ \cos\dfrac{\pi}{8}+12,93 & \ln 13>x \end{cases}$$

x= 41,3 x_1=-19,54 x_2=-1,938

Laboratoriya ishi №8.C++ algoritmik tilning takrorlanish operatorlar. Dasturlari bilan ishlash.

1–variant

$$y=a*\lg|(b+x)^{1/3}+a|+tg75^0$$

$$a=30,01;b=20,5$$

$$x=1(25)150$$

2–variant

$$Z=ax^2+\left(\frac{ax^2+b}{\cos 42^0}\right)^{3/5}$$

$$a=0,02;b=35$$

$$x=20(-2)10$$

3–variant

$$t = \frac{\arcsin^2 \frac{a}{x} - \sqrt{|\cos 30^0 - y|}}{ax + c}$$

$$c = 4; a = 14{,}03; y = 68$$

$$x = 15(1)20$$

4–variant

$$BL = \sqrt{\left(e^a + \ln|a|\right)^2 + 1} + \frac{t^2 - 1}{\sin 40^0 b}$$

$$b = 5; a = 4{,}4$$

$$t = 10(-0{,}1)9$$

5–variant

$$S = \left(\frac{\sin^3 a + \ln|x^2 + a|}{1 + \lg|10x| - b} \right)^2$$

$$a = -2{,}05; b = 12{,}124$$

$$x = -14(1) - 4$$

6–variant

$$B = (y^2 + 1)^{1/7} - \left(\frac{\arcsin \frac{x}{y}}{a^2 x + t} \right)^2$$

$$y = 31; a = 2{,}06; t = 18$$

$$x = 30(-10) - 30$$

7–variant

$$ZK = e^{(a-x)^2 b} + \ln\left|\frac{(a-x)^2}{bt}\right|$$

$$a = 0{,}07; b = 0{,}1; t = 10$$

$$x = -5(1)5$$

8–variant

$$Y = \sin^2 \frac{x}{a+b} + \sqrt{\left|b^2 - t^2\right| + 1}$$

$$a = 18{,}08; b = 40; t = 25$$

$$x = 25(2)45$$

9–variant

$$P = \ln\left|\frac{2a + x^2}{a - x^2}\right| + \frac{\sqrt[3]{t - a^2}}{\sqrt{|t - b^2|}}$$

$$a = 15{,}9; t = 500; b = 200$$

$$x = 0{,}5(0{,}1)1{,}5$$

10–variant

$$Z = \sin^{1/3}\left|\frac{2x - a}{a + b}\right| + \sqrt{\left|b^2 x - a^2\right|}$$

$$b = 3{,}71; a = 7{,}1$$

$$x = -0{,}1(-1{,}1)1{,}5$$

11–variant

$$PK = \ln|x| + \ln|x^2 + \sin 35^0| + \frac{\sqrt{\left|\sqrt[3]{1 - \cos\frac{\pi}{x}}\right|}}{a + N^2}$$

$$a = -0{,}11; N = 22$$

$$x = 10(5)50$$

12–variant

$$S = \frac{ax^2 + bx}{\sqrt{|1 + ax^2|}} + e^{\sin 42^0} * \arcsin\frac{x}{a}$$

$$a = 10{,}12; b = 30$$

$$x = 10(-1)0$$

13–variant

$$AL = \frac{tg\,47^0 * \arccos\frac{\pi}{x}}{\sqrt{1 + \sqrt{\left|\frac{a - c}{x}\right|}}}$$

$$a = 50{,}13; c = 5{,}13$$

$$x = 10(-0{,}4)6$$

14–variant

$$P = \frac{i_m^2 * R}{2} + \frac{i_m^2 * R}{2} * \cos 2wt$$

$$i_m = 1{,}44; R = 30; w = 45$$

$$t = 0(0{,}5)3$$

15–variant

$$Y = 2\sin^2 x - a^3 \cos 2x + be^{-4x}$$

$$a = 3{,}15; b = 500$$

$$x = 2{,}7(-0{,}25)0{,}2$$

16–variant

$$Z = \frac{tg60^0 * \sqrt{|1+\sqrt[5]{x+a}|}}{\arcsin\frac{25\pi}{x}} + \lg\left|\frac{x+c}{N}\right|$$

$$a = 500{,}16; c = 25; N = 30$$

$$x = 100(2)80$$

17–variant

$$AY = e^{\cos 57^0} tg\frac{x}{\pi} + \frac{a - x^2}{\sqrt[4]{|1+\sin x|}}$$

$$a = 25{,}17$$

$$x = 3(-0{,}1)2$$

18–variant

$$P = \left(\frac{t\arcsin\frac{a}{b}}{y^3 + b}\right)^3 - \sqrt[7]{\sin^2 ta}$$

$$y = 15; b = 20; a = -0{,}18$$

$$t = 5(2)15$$

19–variant

$$S = \left(\ln|ax| - c\right)^{2/3} + \frac{a+b}{\sqrt[3]{cx^2}}$$

$$a = 10{,}49; c = 0{,}01; b = 100$$

$$x = 10(7)70$$

20–variant

$$S = \sqrt[5]{\left|x_1 - \sqrt[3]{x_2^2}\right|} + \frac{2{,}02}{x_3}$$

x_1=0,8 x_2=5,4 x_3= -5,22

21–variant

$$X = \frac{t-1}{at^2 + bt} + \lg|t^2 - b^2|$$

$$a = 0{,}2; b = 2$$

$$t = -10(2)10$$

22–variant

$$R = \cos^3 \frac{\pi}{x} + \arcsin \frac{y^2 + 1}{4ax + 10}$$

$$a = -10{,}21; y = 6{,}5$$

$$\tilde{o} = -35(0{,}5) - 8$$

23–variant

$$y = (a + \ln|x| + \lg|x|)^3 + \frac{x}{b + x}$$

$$a = 40{,}22; b = 15$$

$$x = 10(10{,}5)115$$

24–variant

$$T = \left(\frac{1 - ax^2}{1 + a^2}\right)^3 + \frac{\sqrt{b^2 \sin 52^0}}{\sqrt{a \cos 52^0}}$$

$$a = 70.23; b = 10.15$$

$$x = 15{,}5(0{,}2)17{,}5$$

24–variant

$$S = \sqrt[3]{b^2 - tg47^0} + \frac{\sin\frac{\pi}{x} - ax^2}{1 + a^2}$$

$$a = -12{,}24; b = 7{,}77$$

$$x = -5{,}5(-0{,}1)4$$

25–variant

$$M = \frac{(e^{a^2} + c)^{1/3}}{\sin 40^0 + a} + \lg|x - b| * \ln|x - b|$$

$$b = 3{,}24; c = 30; a = 2{,}25$$

$$x = 100(-2)80$$

26–variant

$$L = \frac{1 - a^2 t}{1 + c^2} + \arcsin\left(\frac{61 + t^3}{4t^3}\right)$$

$$a = 10{,}26; c = 7$$

$$t = 5{,}1(0{,}15)6{,}6$$

27–variant

$$N = \frac{R^3}{k-x} + \lg(x^2) + \sqrt{\left|\frac{1+\cos 73^0}{ka}\right|}$$

$R = 12{,}5; k = 35; a = 0{,}27$

$x = 100(5{,}5)45$

28–variant

$$T = arctg\,\frac{y^2+10}{y^3-20} + \frac{ax^2+y}{x^2-y}$$

$a = 10{,}28; y = 3{,}7$

$x = 10(-0{,}5)5$

29–variant

$$Z = \lg|t^7| + \sqrt{|1+a^2t|} + b\sin^2 41^0$$

$a = 3{,}29; b = 35$

$t = 25(1)35$

30–variant

$$P = \left(\frac{t\arccos\frac{c}{b}}{y^3+b}\right)^3 - \sqrt[7]{\sin^2 ta}$$

$y = 30; b = 15; c = -0{,}13$

$t = 3(3)16$

№9. Лаборатория topshiriq variantlari.
C++ algoritmik tilda massivlar bilan ishlash. Bir va ikki o‘lchamli massivlar. Dasturlari bilan ishlash.

1–variant

$$S = \frac{a+b}{2}\sum_{i=1}^{4}\prod_{j=1}^{5}\frac{\ell n\left(i^2+1\right)}{2\cdot i\cdot j}, \quad бу \quad ерда \quad a=5; \quad b=6.$$

2–variant

$$S = \frac{b-a}{2a}\sum_{k=1}^{5}\sum_{\ell=1}^{3}\frac{e^{k-\ell}}{\sqrt{k+\ell}}, \quad бу \quad ерда \quad a=-3{,}5; \quad b=3.$$

3–variant

$$P = \prod_{n=1}^{3}\sum_{m=1}^{5}\frac{sin(n+m^2)}{\sqrt{n+\frac{m}{2}}}$$

4–variant

$$S = a\cdot\sum_{k=1}^{3}\prod_{\ell=1}^{2}\frac{2{,}5^{k+\ell}}{\sqrt[3]{k+\ell}}, \quad бу \quad ерда \quad a=5{,}9.$$

5–variant

$$P=\frac{6,3}{2^x}\prod_{i=1}^{4}\prod_{j=1}^{5}\frac{2,5^{\,i+j}}{i+j} \quad , \quad бу \quad ерда \quad x=3.$$

6–variant

$$S=\sum_{k=1}^{10}\prod_{\ell=1}^{5}\frac{\ell n\left(k^2+\ell\right)}{4,5^{k+\ell}}$$

7–variant

$$S=a^{\sqrt{x}}\cdot\sum_{i=1}^{5}\sum_{j=1}^{6}\frac{ctg\,ij}{5i\,j} \quad , \quad бу \;\; ерда \quad a=3; \quad x=3.$$

8–variant

$$P=\prod_{i=1}^{4}\ell ni+\prod_{j=1}^{5}sin\,j$$

9–variant

$$S=\ell na\cdot\sum_{i=1}^{5}\frac{e^{\,i-1}}{5i}+\sum_{j=1}^{3}\ell n\,j \quad , \quad бу \quad ерда \quad a=3,65.$$

10–variant

$$P=e^{\sqrt[3]{x-3}}\prod_{t=1}^{6}\prod_{q=1}^{7}\frac{t+5}{\ell nq} \quad , \quad бу \quad ерда \quad x=6,59.$$

11–variant

$$P=\prod_{k=1}^{5}\prod_{l=1}^{8}\frac{arccos\,(k+l)}{\sqrt{k^4+l^4}}$$

12–variant

$$S=\sum_{k=1}^{9}\sum_{\ell=1}^{3}\frac{2,5^{\,k+\ell}}{\sqrt[3]{k^{\,\ell}}} \quad ,$$

13–variant

$$S=\sum_{n=1}^{5}\sum_{m=1}^{6}\frac{sin(n+m^{\sqrt{x}})}{\sqrt{m+\dfrac{x}{n}}} \quad , \quad бу \quad ерда \quad x=18,61.$$

14–variant

$$Q=\ell n^{\,2}a\sum_{k=1}^{7}\prod_{\ell=1}^{5}\frac{e^{\,k}-e^{\,-\ell}}{\sqrt{k+\ell^{\,2}}} \quad , \quad бу \;\; ерда \quad a=10,89.$$

15–variant

$$W=\left(b^{\,2}-4,15\right)\sum_{k=1}^{6}\prod_{\ell=1}^{3}\frac{tg^{\,2}(k+\ell)}{k^3+\ell}, \quad бу \quad ерда \quad b=3,09.$$

16–variant

$$Z=\sum_{i=1}^{9}\prod_{j=1}^{10}\frac{sin\left(i^{\,2}+j\right)}{2^{\,i+j}}$$

17–variant

$$P=2a\sum_{i=1}^{5}ctg\,i+5b\prod_{j=1}^{5}tg\,j \quad , \quad бу \quad ерда \quad a=1,5; \quad b=5.$$

18–variant

$$A=\sum_{k=1}^{4}\prod_{\ell=1}^{5}\frac{\ell n^{\,3}(k+\ell)}{5a} \quad , \quad бу\, ерда \quad a=3,5.$$

19–variant

$$Q = e^{2x+1}\prod_{i=1}^{9}\frac{i+1}{5} + e^{\ell n x}\sum_{j=1}^{5}\frac{j-1}{5} \quad , \quad бу \quad ерда \quad x = 4{,}5.$$

20–variant

$$S = \sum_{k=1}^{7}\prod_{t=1}^{3}\frac{\ell n^3 a^t}{2{,}61^{k+t}} \quad , \quad бу \quad ерда \quad a = 10{,}719.$$

21–variant

$$Y = \frac{a+b}{5}\prod_{j=1}^{6}\frac{j+1}{2} + \sum_{i=1}^{3}\ell n i \quad , \quad бу \quad ерда \quad a = -5; \quad b = 3{,}5.$$

22–variant

$$P = \prod_{k=1}^{3}\prod_{j=1}^{4}\frac{arctg\,(k+\pi\cdot j)}{k^2+5}$$

23–variant

$$S = \sum_{n=1}^{6}\prod_{m+1}^{4}\frac{\ell n\left(n^2+m\right)}{4^{\sqrt{n+m+0{,}6}}}$$

24–variant

$$Z = tg\,\frac{2a}{3}\sum_{n=1}^{3}\prod_{m+1}^{5}\frac{\sqrt[3]{n+m^2}}{\sqrt{|n-m|}} \quad , \quad бу \quad ерда \quad a = 0{,}3.$$

25–variant

$$W = z^2\sum_{n=1}^{5}\prod_{\ell=1}^{4}\frac{tg^2(k+\ell)}{2{,}5^{n+\ell}} \quad , \quad бу \quad ерда \quad z = 5.$$

26–variant

$$\sum_{k=1}^{3}\frac{k_i^{\,3}e^3}{k_i^{\,4}+3k_i^{\,2}+e^k};$$

$$\prod_{k=1}^{5}\prod_{i=1}^{6}\frac{k_i^{\,i}}{k_i^{\,4}+3ik_i+e^{k_i}}$$

27–variant

$$\sum_{k=1}^{5}\frac{tg^2k}{1ctgk^2};$$

$$\sum_{i=1}^{5}\prod_{k=5}^{10}\frac{k_i+1}{\sin ik_i+e^{i+k_i}};$$

28–variant

$$\sum_{x=1}^{5}\frac{arctg^2x}{\arcsin x+\pi};$$

$$\prod_{x=1}^{5}\prod_{y=5}^{10}\frac{\log_x y_i}{|\lg x-\lg y_i|}$$

29–variant

$$\prod_{y=5}^{15}\sqrt[3]{\sqrt{\left|e^y-10^{4.5}\right|}};$$

$$\sum_{k=10}^{50}\prod_{y=50}^{100}\frac{\cos^2\frac{k_i}{100}}{\sin(\frac{k_i+1}{5})^2}$$

30–variant

$$\prod_{k=1}^{10}\frac{(k+5)\ln k^2}{k^4+27k+7};$$

$$\sum_{k=5}^{10}\sum_{m=1}^{5}\frac{\arccos\frac{k}{m_i}}{\sqrt[3]{(k-m_i)^2}}$$

№10. Лаборатория topshiriq variantlari.
C++ dasturlash tilining grafik imkoniyatlari. Dasturlari bilan ishlash.

1–variant

1.Quyidagi funkstiyalar grafiklarini chizing.

1. $y=x^2+2x+1$
2. $y=\sin^2 x$
3. $f(x)=x^2-1$ kuk
4. $g(x)=\sin x$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=-2x+0{,}5$ va $y=-x^2-3x-1$
2. $y=-x^2+\frac{x}{2}-1$ va $y=\sin^2 x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing.

$$f(x)=\begin{cases}x^2-1, & x\le -2\\ \dfrac{1}{x+2}, & -2<x\le 3\\ \sqrt{x}, & x>3\end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{9}+z^2=1 \quad x\in[-2;2] \quad y\in[-3;3]$$

$$z=7-2x-y$$

2–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=x^2-2x+1$
2. $y=-\sin x$
3. $f(x)=\frac{x^2-1}{x}$ yashil
4. $g(x)=\cos x$ kora

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=2x+1$ va $y=x^2+3x+0{,}5$
2. $y=-2x^2-x+3$ va $y=-2\sin x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2-1, & x\le -1 \\ \dfrac{1}{x+1}, & -1<x\le 3 \\ \sin x, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2-\sin y}{x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{16}+z^2=1 \quad x\in[-2;2] \quad y\in[-4;4]$$

$$z=8x-6y+5$$

3–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=4x^2+3x-1$
2. $y=2\sin x$
3. $f(x)=\dfrac{2}{x^2-1}$ xavo rang
4. $g(x)=\sin(x^2+1)$ jigarrang

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=\dfrac{x}{2}-1$ va $y=-x^2-3x-1$
2. $y=-2x^2-2x+2$ va $y=\sin(-2x)$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2+1, & x\le 1 \\ \dfrac{1}{x-1}, & 1<x\le 5 \\ \sqrt{x-5}, & x>5 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2+y}{x-y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{25}+z^2=1 \quad x\in[-2;2] \quad y\in[-5;5]$$

$$z=4x+3y-8$$

4–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=x^2-3x+1$
2. $y=\sin 2x$
3. $f(x)=\dfrac{x+1}{x}$ siyoxrang
4. $\mathrm{g(x)}=2^{x+1}$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y = x + 2$ va $y = -x^2 - 2x - 1$

2. $y = -x^2 + \frac{x}{2} - 1$ va $y = \sin^2 x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x) = \begin{cases} \sqrt{x^2 - 1}, & x \le -2 \\ \frac{1}{x+2}, & -2 < x \le 3 \\ \sin x, & x > 3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x, y)} = \frac{xy^2}{x + y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4} + \frac{y^2}{36} + z^2 = 1 \quad x \in [-2;2] \quad y \in [-6;6]$$

$$z = 2x - 3y + 7$$

5–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y = -x^2 - x + 2$
2. $y = \sin x$
3. $f(x) = x^2 - 2$ yashik
4. $g(x) = \mathrm{In\ x}$ xavo rang

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y = -2x - 2$ va $y = -2x^2 + 2x - 1$

2. $y = x^2 + \frac{x}{3} - 2$ va $y = \cos x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x) = \begin{cases} x^2 - 4, & x \le -2 \\ \frac{3}{x+2}, & -2 < x \le 3 \\ \cos x, & x > 3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x, y)} = \frac{x^2 - \sin y}{x + y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9} + \frac{y^2}{4} + z^2 = 1 \quad x \in [-3;3] \quad y \in [-2;2]$$

$$z = x + 5y - 2$$

6–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y = x^2 + 3x + 0{,}5$

2. $y = -\cos 2x - 0{,}5$

3. $f(x) = x^3 - 1$ jigarrang

4. $g(x) = \sin(x - 3)$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y = -x + 2$ va $y = -2x^2 - 3x + 1$

2. $y = \frac{x^2}{2} - x + 1$ va $y = \cos 2x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x) = \begin{cases} (x-1)^2, & x \le -3 \\ \frac{-2}{x+3}, & -3 < x \le 4 \\ \sqrt{x}, & x > 4 \end{cases}$$

4.Berilgan sirtni yasang.

$$F(x, y) = \frac{x^2 + \cos y}{x + y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9} + \frac{y^2}{25} + z^2 = 1 \quad x \in [-3;3] \quad y \in [-5;5]$$

$$z = 5x - 3y - 4$$

7–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y = x^2 + 4x + 1{,}5$

2. $y = \cos 2x - 0{,}5$

3. $f(x) = x^3 + 2$ kuk

4. $g(x) = \cos(x + 3)$ kora

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y = -x + 3$ va $y = -2x^2 - x + 3$

2. $y = -\frac{x^2}{2} - x + 1$ va $y = 2\cos x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x) = \begin{cases} x^2 - 1, & x \le -2 \\ \frac{1}{x+2}, & -2 < x \le 3 \\ \sqrt{x}, & x > 3 \end{cases}$$

4.Berilgan sirtni yasang.

$$F(x, y) = \frac{x^2 + \sqrt{y}}{x + y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{9}+\frac{y^2}{36}+z^2=1 \quad x\in[-3;3] \quad y\in[-6;6]$

$z=x+5y+8$

8–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=-x^2-x+0{,}5$
2. $y=-\sin 2x-0{,}5$
3. $f(x)=3(x^3-2)$ siyoxrang
4. $g(x)=\cos^2(\mathrm{x}\text{-}1)$ kora

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=-x+5$ va $y=-x^2+\frac{x}{2}-1$
2. $y=x^2-2x-\frac{4}{5}$ va $y=\cos^2 x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases}x^2-1, & x\le -1\\ \dfrac{1}{x+1}, & -1<x\le 3\\ \sin x, & x>3\end{cases}$$

4.Berilgan sirtni yasang.

$\mathrm{F(x,y)}=\frac{x^2-y}{x+y}$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{16}+\frac{y^2}{4}+z^2=1 \quad x\in[-4;4] \quad y\in[-2;2]$

$z=4y-3x-5$

9–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=-x^2-2x-1$
2. $y=\sin 2x-0{,}5$
3. $f(x)=2(x^3+1)$ kuk
4. $g(x)=\sin^2(x+1)$ yashil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=-x+6$ va $y=x^2+\frac{x}{3}-2$
2. $y=-x^2-\frac{x}{3}+1$ va $y=-\cos x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2+1, & x\le 1 \\ \dfrac{1}{x-1}, & 1<x\le 5 \\ \sqrt{x-5}, & x>5 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{x-y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{9}+z^2=1 \quad x\in[-2;2] \quad y\in[-3;3]$$

$$z=7-2x-y$$

10–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=-x^2-3x-1$
2. $y=-\cos 2x+0{,}5$
3. $f(x)=\dfrac{2}{x^2-1}$ xavo rang
4. $g(x)=Inx$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=x+3$ va $y=\dfrac{x^2}{2}-x+1$
2. $y=\dfrac{x^2}{3}-2x+1$ va $y=-\cos 2x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} \sqrt{x^2-1}, & x\le -2 \\ \dfrac{1}{x+2}, & -2<x\le 3 \\ \sin x, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2-\cos y}{x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{16}+z^2=1 \quad x\in[-2;2] \quad y\in[-4;4]$$

$$z=8x-6y+5$$

11–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=-2x^2+2x-1$
2. $y=\cos 2x+0{,}5$

3. $f(x)=x^3-1$ jigarrang

4. $g(x)=sin^3(x+1)$ yashil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=2x+2$ va $y=-\frac{x^2}{2}-x+1$

2. $y=-\frac{x^2}{3}-2x+1$ va $y=-2\cos x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2-4, & x\le -2 \\ \dfrac{3}{x+2}, & -2<x\le 3 \\ \cos x, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$F(x,y)=\frac{x^2-\sin y}{x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{25}+z^2=1 \quad x\in[-2;2] \quad y\in[-5;5]$$

$$z=4x+3y-8$$

12–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=-2x^2-3x+1$

2. $y=-\sin 2x+0{,}5$

3. $f(x)=x^2-1$ kuk

4. $g(x)=sin(x^2+1)$ jigarrang

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=2x+3$ va $y=x^2-2x-\frac{4}{5}$

2. $y=4x^2+3x-1$ va $y=\sin x+0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} (x-1)^2, & x\le -3 \\ \dfrac{-2}{x+3}, & -3<x\le 4 \\ \sqrt{x}, & x>4 \end{cases}$$

4.Berilgan sirtni yasang.

$$F(x,y)=\frac{x^2+\cos y}{x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{4}+\frac{y^2}{36}+z^2=1 \quad x\in[-2;2] \quad y\in[-6;6]$

$z=2x-3y+7$

13–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=-2x^2-x+3$
2. $y=\sin 2x+0{,}5$
3. $f(x)=2(x^3+1)$ kuk
4. $g(x)=\sin x$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=2x-\frac{1}{4}$ va $y=-x^2-\frac{x}{3}+1$
2. $y=x^2-2x+1$ va $y=\sin x-0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2-1, & x\le -2 \\ \dfrac{1}{x+2}, & -2<x\le 3 \\ \sqrt{x}, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$F(x,y)=\frac{x^2+\cos y}{x-y}$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{9}+\frac{y^2}{4}+z^2=1 \quad x\in[-3;3] \quad y\in[-2;2]$

$z=x+5y-2$

14–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=-2x^2-2x+2$
2. $y=-\cos x-0{,}5$
3. $f(x)=\frac{x^2-1}{x}$ yashil
4. $g(x)=2^{x+1}$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=3x+0{,}5$ va $y=\frac{x^2}{3}-2x+1$
2. $y=-x^2-x+2$ va $y=-\sin x+0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2-1, & x\le -1 \\ \dfrac{1}{x+1}, & -1<x\le 3 \\ \sin x, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{\sin y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9}+\frac{y^2}{25}+z^2=1 \quad x\in[-3;3] \quad y\in[-5;5]$$

$$z=5x-3y-4$$

15–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=-x^2+\dfrac{x}{2}-1$
2. $y=-\cos x+0{,}5$
3. $f(x)=x^3-1$ jigar rang
4. $g(x)=\cos^2(x-1)$ javo rang

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=4x-1$ va $y=-\dfrac{x^2}{3}-2x+1$
2. $y=x^2-3x+1$ va $y=-\sin x-0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2+1, & x\le 1 \\ \dfrac{1}{x-1}, & 1<x\le 5 \\ \sqrt{x-5}, & x>5 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{\sin y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9}+\frac{y^2}{36}+z^2=1 \quad x\in[-3;3] \quad y\in[-6;6]$$

$$z=x+5y+8$$

16–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=x^2+\dfrac{x}{3}-2$
2. $y=\cos x-0{,}5$
3. $f(x)=\dfrac{x+1}{x}$ siyoxrang
4. $g(x)=\sin(x-3)$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=-3x+1$ va $y=4x^2+3x-1$

2. $y=x^2+2x+1$ va $y=\cos x+0{,}5$

3.i Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases}\sqrt{x^2-1}, & x\le -2\\ \dfrac{1}{x+2}, & -2<x\le 3\\ \sin x, & x>3\end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{\sin x}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{16}+\frac{y^2}{4}+z^2=1 \quad x\in[-4;4] \quad y\in[-2;2]$$

$$z=4y-3x-5$$

17–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=\dfrac{x^2}{2}-x+1$

2. $y=\cos x+0{,}5$

3. $f(x)=3(x^3-2)$ siyoxrang

4. $g(x)=\cos x$ kora

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=\dfrac{x}{4}+3$ va $y=x^2-2x+1$

2. $y=\dfrac{x^2}{3}+x+2$ va $y=\cos x-0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases}x^2-4, & x\le -2\\ \dfrac{3}{x+2}, & -2<x\le 3\\ \cos x, & x>3\end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{\cos x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{9}+z^2=1 \quad x\in[-2;2] \quad y\in[-3;3]$$

$$z=7-2x-y$$

18–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=-\frac{x^2}{2}-x+1$

2. $y=-\sin x-0{,}5$

3. $f(x)=\frac{3x^2}{1+x}$ kizil

4. $g(x)=Cosx$ kora

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=-\frac{x}{4}-1$ va $y=-x^2-x+2$

2. $y=-\frac{x^2}{3}-x+4$ va $y=-\cos x+0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases}(x-1)^2, & x\le -3\\ \frac{-2}{x+3}, & -3<x\le 4\\ \sqrt{x}, & x>4\end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{\cos x-y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{16}+z^2=1 \quad x\in[-2;2] \quad y\in[-4;4]$$

$$z=8x-6y+5$$

19–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=x^2-2x-\frac{4}{5}$

2. $y=-\sin x+0{,}5$

3. $f(x)=2x^3-\sin x$ sarik

4. $g(x)=x-1$ kuk

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=-\frac{x}{5}+0{,}5$ va $y=x^2-3x+1$

2. $y=\frac{x^2}{2}+\frac{x}{3}-1$ va $y=-\cos x-0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases}x^2-1, & x\le -2\\ \frac{1}{x+2}, & -2<x\le 3\\ \sqrt{x}, & x>3\end{cases}$$

4.Berilgan sirtni yasang.

$$F(x, y) = \frac{x^2 y}{x + \cos y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4} + \frac{y^2}{25} + z^2 = 1 \quad x \in [-2;2] \quad y \in [-5;5]$$

$$z = 4x + 3y - 8$$

20–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y = -x^2 - \frac{x}{3} + 1$
2. $y = \sin x - 0{,}5$
3. $f(x) = \sin^2 x - 1$ kizil
4. $g(x) = x^3 + 1$ sarik

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y = -\frac{x}{5} + 0{,}5$ va $y = x^2 + 2x + 1$
2. $y = \frac{x^2}{3} + \frac{x}{2} - 2$ va $y = \sin 2x + 0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x) = \begin{cases} x^2 - 1, & x \le -1 \\ \frac{1}{x+1}, & -1 < x \le 3 \\ \sin x, & x > 3 \end{cases}$$

4.Berilgan sirtni yasang.

$$F(x, y) = \frac{x^2 - y}{x + \sin y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4} + \frac{y^2}{36} + z^2 = 1 \quad x \in [-2;2] \quad y \in [-6;6]$$

$$z = 2x - 3y + 7$$

21–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y = \frac{x^2}{3} - 2x + 1$
2. $y = \sin x + 0{,}5$
3. $f(x) = \log x$ kuk
4. $g(x) 2Sinx$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y = \frac{x}{5} + 1$ va $y = \frac{x^2}{3} + x - 1$

2. $y=-\frac{x^2}{2}-\frac{x}{3}-3$ va $y=-\sin 2x+0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2+1, & x\le 1 \\ \frac{1}{x-1}, & 1<x\le 5 \\ \sqrt{x-5}, & x>5 \end{cases}$$

4.Berilgan sirtni yasang.

$$\text{F(x, y)} = \frac{x^2 y}{\sin x + y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9}+\frac{y^2}{4}+z^2=1 \quad x\in[-3;3] \quad y\in[-2;2]$$

$$z=x+5y-2$$

22–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=-\frac{x^2}{3}-2x+1$
2. $y=-2\cos x$
3. $f(x)=tg(x+1)$ sarik
4. $g(x)x^2\ {}^2\!/_3$ kuk

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=5x-0{,}5$ va $y=\frac{x^2}{3}+x+2$
2. $y=-x^2+\frac{x}{4}-0{,}5$ va $y=\cos 2x+0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} \sqrt{x^2-1}, & x\le -2 \\ \frac{1}{x+2}, & -2<x\le 3 \\ \sin x, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\text{F(x, y)} = \frac{x^2+y}{x-\cos y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9}+\frac{y^2}{25}+z^2=1 \quad x\in[-3;3] \quad y\in[-5;5]$$

$$z=5x-3y-4$$

23–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y = \frac{x^2}{3} + x - 1$
2. $y = -\cos 2x$
3. $f(x) = tg(x+1)$ sarik
4. $g(x)\frac{1+x^2}{x^2}$ yashil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y = 5x - 4$ va $y = -\frac{x^2}{3} - x + 4$
2. $y = -x^2 - \frac{x}{4} + 3{,}5$ va $y = -\cos 2x + 0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x) = \begin{cases} x^2 - 4, & x \le -2 \\ \frac{3}{x+2}, & -2 < x \le 3 \\ \cos x, & x > 3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x, y)} = \frac{xy^2}{\sin x + y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9} + \frac{y^2}{36} + z^2 = 1 \quad x \in [-3;3] \quad y \in [-6;6]$$

$$z = x + 5y + 8$$

24–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y = \frac{x^2}{3} + x + 2$
2. $y = -\cos x$
3. $f(x) = 2(x^2 + 1)$ yashil
4. $g(x) = \cos x + 1$yashil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y = 6x - \frac{3}{2}$ va $y = \frac{x^2}{2} + \frac{x}{3} - 1$
2. $y = x^2 + 3x + 0{,}5$ va $y = \sin 2x - 0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x) = \begin{cases} (x-1)^2, & x \le -3 \\ \frac{-2}{x+3}, & -3 < x \le 4 \\ \sqrt{x}, & x > 4 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x, y)} = \frac{xy^2}{x + \sin y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{16}+\frac{y^2}{4}+z^2=1 \quad x\in[-4;4] \quad y\in[-2;2]$

$z=4y-3x-5$

25–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=-\frac{x^2}{3}-x+4$
2. $y=\cos^2 x$
3. $f(x)=x^3-1$ jigar rang
4. $g(x)=\cos^2(x-1)$ javo rang

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=\frac{2x}{3}+1$ va $y=\frac{x^2}{3}+\frac{x}{2}-2$
2. $y=\frac{x^2}{3}+x-1$ va $y=-\sin 2x-0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2-1, & x\le -2 \\ \frac{1}{x+2}, & -2<x\le 3 \\ \sqrt{x}, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$\mathrm{F(x,y)}=\frac{xy^2}{x+y}$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{4}+\frac{y^2}{25}+z^2=1 \quad x\in[-2;2] \quad y\in[-5;5]$

$z=4x+3y-8$

26–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=\frac{x^2}{2}+\frac{x}{3}-1$
2. $y=2\cos x$
3. $f(x)=2(x^3+1)$ kuk
4. $g(x)=\sin^2(x+1)$ yashil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=\frac{3x}{2}-1$ va $y=-\frac{x^2}{2}-\frac{x}{3}-3$
2. $y=x^2+4x+1{,}5$ va $y=\cos 2x-0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2-1, & x\le -1 \\ \dfrac{1}{x+1}, & -1<x\le 3 \\ \sin x, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{xy^2}{\cos x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{16}+z^2=1 \quad x\in[-2;2] \quad y\in[-4;4]$$

$$z=8x-6y+5$$

27–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=\dfrac{x^2}{3}+\dfrac{x}{2}-2$
2. $y=\cos 2x$
3. $f(x)=\dfrac{x+1}{x}$ siyoxrang
4. $\mathrm{g(x)}=2^{x+1}$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=\dfrac{x}{2}+\dfrac{2}{3}$ va $y=-x^2+\dfrac{x}{4}-0{,}5$
2. $y=-x^2-x+0{,}5$ va $y=-\cos 2x-0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2+1, & x\le 1 \\ \dfrac{1}{x-1}, & 1<x\le 5 \\ \sqrt{x-5}, & x>5 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{x+\cos y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{25}+z^2=1 \quad x\in[-2;2] \quad y\in[-5;5]$$

$$z=4x+3y-8$$

28–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=-\dfrac{x^2}{2}-\dfrac{x}{3}-3$
2. $y=\cos x$
3. $f(x)=x^2-1$ kuk
4. $g(x)=\sin x$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=-8x+1$ va $y=-x^2-\frac{x}{4}+3{,}5$

2. $y=-x^2-2x-1$ va $y=\sin x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases}\sqrt{x^2-1}, & x\le -2\\ \dfrac{1}{x+2}, & -2<x\le 3\\ \sin x, & x>3\end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,\ y)}=\frac{x^2-y}{\sin y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{36}+z^2=1 \quad x\in[-2;2] \quad y\in[-6;6]$$

$$z=2x-3y+7$$

29–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=-x^2+\frac{x}{4}-0{,}5$

2. $y=\sin(-2x)$

3. $f(x)=\frac{3x^2}{1+x}$ kizil

4. $g(x)=Cosx$ kora

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y=x+3$ va $y=\frac{x^2}{2}-x+1$

2. $y=-x^2-3x-1$ va $y=\sin 2x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases}x^2-4, & x\le -2\\ \dfrac{3}{x+2}, & -2<x\le 3\\ \cos x, & x>3\end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{x+\cos y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9}+\frac{y^2}{4}+z^2=1 \quad x\in[-3;3] \quad y\in[-2;2]$$

$$z=x+5y-2$$

30–variant

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y = -x^2 - \frac{x}{4} + 3{,}5$
2. $y = -2\sin x$
3. $f(x) = tg(x+1)$ sarik
4. $g(x)x^2$ $2/3$ kuk

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

1. $y = -x + 2$ va $y = -2x^2 - 3x + 1$
2. $y = -2x^2 + 2x - 1$ va $y = 2\sin x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x) = \begin{cases} (x-1)^2, & x \le -3 \\ \dfrac{-2}{x+3}, & -3 < x \le 4 \\ \sqrt{x}, & x > 4 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x, y)} = \frac{\cos x + y^2}{x + y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9} + \frac{y^2}{25} + z^2 = 1 \quad x \in [-3;3] \quad y \in [-5;5]$$

$$z = 5x - 3y - 4$$

II SEMESTR. AMALYOT ISHINI TARQATMA MATERIALI.

Amaliyot ishi №1. Matematik modellarni elektron jadvalidagi tatqiqoti.

1-masala. Berilgan chiziqli algebraik tenglamalar sistemalarini Kramer, Gauss va teskari matritsa usullari yordamida yeching.

2-masala. Quyida berilgan tenglamalar sistemalarini iteratsiya usuli yordamida ε=0,001 aniqlikda yeching.

1. $\begin{cases} 2x_1 - x_2 + x_3 - x_4 = 1 \\ 2x_1 - x_2 - 3x_4 = 2 \\ 3x_1 - x_3 + x_4 = -3 \\ 2x_1 + 2x_2 - 2x_3 - 5x_4 = -6 \end{cases}$

2. $\begin{cases} x_1 + 5x_2 = 2 \\ 2x_1 - x_2 + 3x_3 + 2x_4 = 4 \\ 3x_1 - x_2 - x_3 + 2x_4 = 6 \\ 3x_1 - x_2 + 3x_3 - x_4 = 6 \end{cases}$

3. $\begin{cases} x_1 + x_2 - x_3 - x_4 = 0 \\ x_2 + 2x_3 - x_4 = 2 \\ x_1 - x_2 - x_4 = -1 \\ -x_1 + 3x_2 - 2x_3 = 0 \end{cases}$

4. $\begin{cases} x_1 - 4x_2 = 2 \\ x_1 + x_2 + 2x_3 + 3x_4 = 1 \\ 2x_1 + 3x_2 - x_3 - x_4 = -6 \\ x_1 + 2x_2 + 3x_3 - x_4 = -4 \end{cases}$

5. $\begin{cases} 5x_1 + x_2 - x_4 = 9 \\ 3x_1 - 3x_2 - x_3 + 4x_4 = -1 \\ 3x_1 - 2x_3 + x_4 = -16 \\ x_1 - 4x_2 + x_4 = 0 \end{cases}$

6. $\begin{cases} 5x_1 - x_2 + x_3 + 3x_4 = -4 \\ x_1 + 2x_2 + 3x_3 - 2x_4 = 6 \\ 2x_1 - x_2 - 2x_3 - 3x_4 = 8 \\ 3x_1 + x_2 + x_3 + 2x_4 = 4 \end{cases}$

7. $\begin{cases} 2x_1 + x_3 + 4x_4 = 9 \\ x_1 + 2x_2 - x_3 + x_4 = 8 \\ 2x_1 + x_2 + x_3 + x_4 = 5 \\ x_1 - x_2 + 2x_3 + x_4 = -1 \end{cases}$

8. $\begin{cases} 4x_1 - 2x_2 + x_3 - 4x_4 = 3 \\ 2x_1 - x_2 + x_3 - x_4 = 1 \\ 3x_1 - x_3 + x_4 = -3 \\ 2x_1 + 2x_2 - 2x_3 + 5x_4 = -6 \end{cases}$

9. $\begin{cases} 2x_1 - 6x_2 + 2x_3 + 2x_4 = 12 \\ x_1 + 3x_2 + 5x_3 + 7x_4 = 12 \\ 3x_1 + 5x_2 + 7x_3 + x_4 = 0 \\ 5x_1 + 7x_2 + x_3 + 3x_4 = 4 \end{cases}$

10. $\begin{cases} 2x_1 - x_3 - 2x_4 = -1 \\ x_2 + 2x_3 - x_4 = 2 \\ x_1 - x_2 - x_4 = 1 \\ -x_1 + 3x_2 - 2x_3 = 0 \end{cases}$

11. $\begin{cases} x_1 + x_2 + 2x_3 + 3x_4 = 1 \\ 3x_1 - x_2 - x_3 - 2x_4 = -4 \\ 2x_1 + 3x_2 - x_3 - x_4 = -6 \\ x_1 + 2x_2 + 3x_3 - x_4 = -4 \end{cases}$

12. $\begin{cases} x_1 + 5x_2 + 3x_3 - 4x_4 = 20 \\ 3x_1 + x_2 - 2x_3 = 9 \\ 5x_1 + 7x_2 + 10x_4 = -9 \\ 3x_2 - 5x_3 = 1 \end{cases}$

13. $\begin{cases} x_1 + 2x_2 + 3x_3 - 2x_4 = 6 \\ x_1 - x_2 - 2x_3 - 3x_4 = 8 \\ 3x_1 + 2x_2 - x_3 + 2x_4 = 4 \\ 2x_1 - 3x_2 + 2x_3 + x_4 = -8 \end{cases}$

14. $\begin{cases} 2x_1 + x_2 - 5x_3 + x_4 = 8 \\ x_1 - 3x_2 - 6x_4 = 9 \\ 2x_2 - x_3 + 2x_4 = -5 \\ x_1 + 4x_2 - 7x_3 + 6x_4 = 0 \end{cases}$

15. $\begin{cases} x_1 + 2x_2 + 3x_3 + 4x_4 = 5 \\ 2x_1 + x_2 + 2x_3 + 3x_4 = 1 \\ 3x_1 + 2x_2 + x_3 + 2x_4 = 1 \\ 4x_1 + 3x_2 + 2x_3 + x_4 = -5 \end{cases}$

16. $\begin{cases} 10x_1 - 2x_2 + x_3 = 24 \\ x_1 + 4x_2 + 3x_3 = 8 \\ 2x_1 + x_2 - 8x_3 = -9 \end{cases}$

17. $\begin{cases} 4x_1 - x_2 + 2x_3 = 7 \\ 2x_1 + 5x_2 - x_3 = 6 \\ x_1 + 2x_2 + 7x_3 = 2 \end{cases}$

18. $\begin{cases} x_1 + 0{,}1x_2 - 0{,}25x_3 = 1 \\ 0{,}3x_1 + 2x_2 + x_3 = 4 \\ x_1 - 0{,}4x_2 + 4x_3 = 3{,}5 \end{cases}$

19. $\begin{cases} 3x_1 + 0{,}5x_2 - x_3 = 3 \\ -0{,}7x_1 + 5x_2 + 2x_3 = -2{,}5 \\ x_1 + 0{,}5x_2 + x_3 = 1{,}8 \end{cases}$

20. $\begin{cases} 7x_1 + 2x_2 - x_3 = 0{,}7 \\ -2x_1 + 6x_2 + 1{,}5x_3 = 1 \\ 1{,}2x_1 + 1{,}7x_2 + 4x_3 = 0{,}6 \end{cases}$

21. $\begin{cases} 5x_1 + 2x_2 - 0{,}6x_3 = -4 \\ x_1 + 3x_2 + 0{,}9x_3 = 5 \\ 1{,}3x_1 + x_2 + 7x_3 = 1 \end{cases}$

22. $\begin{cases} 2x_1 + 0{,}5x_2 - 0{,}6x_3 = 9 \\ -0{,}8x_1 + 3x_2 + x_3 = 3 \\ 2x_1 + x_2 + 5x_3 = 4 \end{cases}$

23. $\begin{cases} 12x_1 - 2x_2 + 3x_3 = 19 \\ 2x_1 + 7x_2 - x_3 = -6 \\ 3x_1 - x_2 + 6x_3 = 7 \end{cases}$

24. $\begin{cases} 8x_1 - x_2 + 5x_3 = 11 \\ x_1 + 4x_2 - 2x_3 = 6 \\ 2x_1 + x_2 + 5x_3 = -4 \end{cases}$

25. $\begin{cases} x_1 + 0{,}1x_2 - 0{,}3x_3 = 1{,}3 \\ x_1 + 4x_2 - 3x_3 = 1 \\ 2x_1 + x_2 + 5x_3 = 2 \end{cases}$

26. $\begin{cases} 3x_1 - x_2 - x_3 = -5 \\ x_1 + 6x_2 - 3x_3 = 4 \\ 2x_1 - 2x_2 + 7x_3 = 3 \end{cases}$

27. $\begin{cases} 12x_1 - x_2 + 2x_3 = 19 \\ x_1 + 6x_2 + 3x_3 = 7 \\ 4x_1 + x_2 + 9x_3 = 23 \end{cases}$

28. $\begin{cases} 5x_1 + 2x_2 - x_3 = 8 \\ x_1 + 10x_2 - 7x_3 = 5 \\ 3x_1 + x_2 + 8x_3 = 7 \end{cases}$

29. $\begin{cases} 14x_1 + 3x_2 + x_3 = 31 \\ 3x_1 + 8x_2 - x_3 = 17 \\ 7x_1 + x_2 + 11x_3 = 24 \end{cases}$

30. $\begin{cases} 6x_1 + x_2 + 2x_3 = 7 \\ x_1 + 4x_2 + 2x_3 = 10 \\ 5x_1 + x_2 + 14x_3 = 18 \end{cases}$

Amaliyot ishi №2. Elektron jadvalda berilganlarni statistik uslubida qayta ishlash.

1-masala. Berilgan tenglamalarni oraliqni teng ikkiga bo‘lish va vatarlar usullari yordamida ε=0,01 aniqlikda taqribiy yeching.

2-masala. Berilgan tenglamalarni urinmalar usuli yordamida ε=0,01 aniqlikda taqribiy yeching.

1. $x^3+2x-5=0$	[0;2]	2. $e^x+2x-7=0$	[0;2]
3. $2x-3-sinx=0$	[0,5;2,5]	4. $cosx-x^3-x=0$	[0;1]
5. $xsinx+x-1=0$	[0;1]	6. $x-e^x+2=0$	[-2;-1]
7. $x^3-2x^2-x+2=0$	[1,1;2,5]	8. $2^{-x}-x=0$	[0;1]
9. $3^x+x-6=0$	[1;2]	10. $x+log_2x-2=0$	[1;2]
11. $x+2-e^{-x}=0$	[-1;0]	12. $x+0,5\cdot(2,5)^x-3,5=0$	[0,5;1,5]
13. $lnx-2+x=0$	[1;2]	14. $e^{2x}+2x-5=0$	[0,5;1,5]
15. $9x-2+10^{0,5x}=0$	[0;1]	16. $x^5-x-0,2=0$	[0,5;1,5]
17. $x^4-3x^2+75x-100=0$	[0;7]	18. $x+2^x-2=0$	[0;1]
19. $x^3-2x^2-x+2=0$	[0;12]	20. $4^x+2x=0$	[0,5;1,5]
21. $e^x-2+x=0$	[0,5;1,5]	22. $sinx-2x=0$	[0,5;6,5]
23. $x^4+x^2-x-4=0$	[0,5;1,5]	24. $5^x-x^2-2=0$	[0,5;2,5]
25. $log_{0,5}x-x^2-1=0$	[0,5;3,5]	26. $e^{2x}-x^2-3=0$	[0,5;5,5]
27. $3^x+2x=0$	[0,5;4,5]	28. $e^{3x}+4x-6=0$	[0,5;3,5]
29. $x^3-3x^2+5x-3=0$	[0;8]	30. $2x^3-3x^2+4x-6=0$	[0;10]

Amaliyot ishi №3. Matematik modellashtirishning transport masalalarini elektron jadval yordamida yechish.

№1 Variant

Yunus Obod metropolitenidan foydalanuvchilar xisobi				
	oy	Yulovchi soni	Yul xakka	jami
1	Yanvar	325606	150	
2	Fevral	365687	150	
3	Mart	345689	160	

4	Aprel	345678	160	
5	May	305684	160	
jami				

№2 Variant

Toshkent-Moskva avareysi yulovchilari 1 oylik yul xaki tulovi xisobi				
	Oy	Yulovchi soni	Yul xakka	jami
1	AN-24	57	120000	
2	TU-32	125	125000	
3	TU-154	150	130000	
4	IL-154	250	135000	
5	TU-154	150	130000	
jami				

№3 Variant

«Fayz mebel» firmasining kvartal bo‘yicha maxalliy byudjetga ajratma xisoboti				
	Kvartal	Oylik tushum	Aylanma summa 3 oy	Maxaliy byudjet 15%
1	I	1200150		
2	II	1300200		
3	III	1250000		
4	IV	1250000		
5	JAMI			

№4 Variant

Firmaning 1 kvartalda maxsulotni sotishdan olgan daromadi (million sum xisobida)				
	Tushuncha	Yanvar	Fevral	jami
1	Sotish xajmi	205,7	250,15	
2	Sotib olishgan ketgan xarajat	218,5	304,8	
3	Keltirish sarfi	58,6	78,12	
4	foyda			

№5 Variant

Kunlik umumiy xarajatingiz xisobi				
	1 kunga xarajat sum	2 kunga xarajat sum	3 kunga xarajat sum	jami
Ertalab	800	750	800	
Obod	1500	2500	1800	
Tushlik	600	200	400	
Kechki ovkat	2000	2000	2500	
Madaniy tadbirlar	1000	500	100	
Jami				

№6 Variant

Tashkilot bo‘limlarida xizmat safari xarajatlari xisobi (million Sum xisobida)				
bo‘limlar	2003	2004	2005	jami
Texnika ta’minoti	131,2	125,4	160,2	
Xisobxona	150,3	145,2	150,2	
Xodimlar bo‘limii	160,4	160,3	125,3	
1 bo‘lim	25,1	30,1	35,4	
II bo‘lim	27,4	35,4	60,2	
jami				

№7 Variant

Oliy matematika kursi bo‘yicha uzlashtirish xisobi				
	Kurs	Talaba soni	Topshirganlar	jami
1	1 kurs	200	190	
2	2 kurs	180	175	
3	4 kurs	150	148	
4	1 k magistr	70	68	
5	2 k magistr	70	70	
jami				

№8 Variant

Korxonaning 2006 yil oylar bo‘yicha umumiy aylanmadan maxalliy byudjetga mablag utkazish xisobi			
	Oy	Aylanma summa	Maxalliy byudetga ajratma 5%
1	Yanvar	120000	
2	Fevral	226000	
3	Mart	325000	
4	Aprel	250000	
5	May	245000	
6	Iyun	256000	
7	Iyul	154000	
8	Avgust	254000	
9	Sentyabr	245000	
10	Oktyabr	245000	
11	Noyabr	245600	
12	Dekabr	245600	

№9 Variant

Mashxura ukuv kursining kvartal bo‘yicha maxalliy byudjetga ajratma xisoboti				
	Kvartal	Oylik tushum	Aylanma summa 3 oy	Maxaliy byudjet 15%
1	I	1200150		
2	II	1300200		
3	III	1250000		
4	IV	1250000		
5	JAMI			

№10 Variant

Korxonaning 2005 yil oylar bo‘yicha umumiy aylanmadan maxalliy byudjetga mablag utkazish xisobi			
	oy	Aylanma summa	Maxalliy byudetga ajratma 15%
1	Yanvar	110000	
2	Fevral	75000	
3	Mart	155000	
4	Aprel	100000	
5	May	95000	
6	Iyun	56000	
7	Iyul	254000	
8	Avgust	154000	
9	Sentyabr	185000	
10	Oktyabr	195000	
11	Noyabr	185600	
12	Dekabr	170600	

№11 Variant

Firma dukoni sotgan muxsulotlaridan olingan solik xisobi				
	Maxsulot nomi	soni	narxi	Solikka ajratma 18%
1	Televizor LG	250	1600150	
2	Ŝentr LG	150	2000200	
3	Monitor LG	175	1250000	
4	Printer LG	89	1150000	
5	Skaner LG	60	800000	
jami				

№12 Variant

Ozik-ovkat dukoni sotgan muxsulotlaridan olingan solik xisobi				
	Maxsulot nomi	Kg	Narxi	Solikka ajratma 17%
1	Manniy krupa	700	1200	
2	Karamel	600	3000	
3	Shakar	1000	1150	
4	Un	1500	800	
5	Makaron	800	900	
jami				

№13 Variant

Chilonzor metropolitenidan foydalanuvchilar xisobi				
	oy	Yulovchi soni	Yul xakka	jami
1	Yanvar	425606	150	
2	Fevral	465687	150	
3	Mart	445689	160	
4	Aprel	445678	160	
5	May	405684	160	
jami				

№14 Variant

Ukituvchilarning 2005/2006 ukuv yili yuklamasining bajarish

	Familiya, ismi, sharifi	Reja	Bajaridi	% xisobi
1	Suyarov A	760	780	
2	Oripov SH	760	766	
3	Masharipov A	840	851	
4	Roipov T	920	919	
5	Uktamov S	920	912	
jami				

№15 Variant

Suvokchilar brigadalarining oylik rejadarini bajarishi				
	Brigada nomeri	Reja (kv metr xisobida)	Bajarilgani	Usish xisobida %
1	1	3400	3400	
2	2	2900	2700	
3	3	6000	4000	
4	4	1600	1400	
5	5	1500	1350	
jami				

№16 Variant

Toshkent metropolitenidan foydalanuvchilar xisobi				
	oy	Yulovchi soni	Yul xakka	jami
1	Yanvar	325606	150	
2	Fevral	365687	150	
3	Mart	345689	160	
4	Aprel	345678	160	
5	May	305684	160	
6	Iyun	25000	160	
7	Iyul	24500	160	
8	Avgust	258000	160	
9	Sentyabr	364210	160	
jami				

№17 Variant

Moskva - London avareysi yulovchilari 1 oylik yul xaki tulovi xisobi				
	Oy	Yulovchi soni	Yul xakka	jami
1	AN-24	57	220000	
2	TU-32	125	175000	
3	TU-154	150	250000	
4	IL-154	250	345000	
5	TU-154	150	340000	
jami				

№18 Variant

«Nazokat» firmasining kvartal bo‘yicha maxalliy byudjetga ajratma xisoboti				
	Kvartal	Oylik tushum	Aylanma summa 3 oy	Maxaliy byudjet 21%
1	I	200150		
2	II	300200		

3	III	250000		
4	IV	250000		
5	JAMI			

№19 Variant

Tashkilot bo‘limlarida xizmat safari xarajatlari xisobi (million Sum xisobida)				
bo‘limlar	2004	2005	2006	jami
Texnika ta’minoti	140,2	125,4	250,2	
Xisobxona	150,3	170,2	200,2	
Xodimlar bo‘limii	134,4	160,3	175,3	
1 bo‘lim	67,1	80,1	89,4	
II bo‘lim	89,4	90,4	90,2	
jami				

№20 Variant

Axborot texnologiyalari kursi bo‘yicha uzlashtirish xisobi				
	kurs	Talaba soni	Topshirganlar	jami
1	1 kurs	250	240	
2	2 kurs	200	195	
3	4 kurs	160	158	
4	1 k magistr	80	70	
5	2 k magistr	70	68	
jami				

№21 Variant

Korxonaning 2004 yil oylar bo‘yicha umumiy aylanmadan maxalliy byudjetga mablag utkazish xisobi			
	oy	Aylanma summa	Maxalliy byudetga ajratma 5%
1	Yanvar	251000	
2	Fevral	245860	
3	Mart	325600	
4	Aprel	325600	
5	May	325400	
6	Iyun	365000	
7	Iyul	450123	
8	Avgust	245803	
9	Sentabr	245870	
10	Oktabr	325406	
11	Noyabr	245830	
12	Dekabr	265000	

№22 Variant

Najot firmasining kvartal bo‘yicha maxalliy byudjetga ajratma xisoboti				
	Kvartal	Oylik tushum	Aylanma summa 3 oy	Maxaliy byudjet 15%
1	I	12457895		
2	II	45126589		
3	III	52468922		

4	IV	62548923		
5	JAMI	64521254		

№23 Variant

Firma dukoni sotgan muxsulotlaridan olingan soliq xisobi				
	Maxsulot nomi	soni	narxi	Solikka ajratma 18%
1	Televizor LG	3256	1600150	
2	Sentr LG	1256	2000200	
3	Monitor LG	2154	1250000	
4	Printer LG	1545	1150000	
5	Skaner LG	578	800000	
jami				

№24 Variant

Oziq-ovqat dukoni sotgan muxsulotlaridan olingan soliq xisobi				
	Maxsulot nomi	Kg	narxi	Solikka ajratma 17%
1	Manniy krupa	5000	1200	
2	Karamel	4500	3000	
3	Shakar	2000	1150	
4	Un	7500	800	
5	Makaron	1200	900	
jami				

№25 Variant

Chilonzor metropolitenidan foydalanuvchilar xisobi				
	oy	Yulovchi soni	Yul xakka	jami
1	Yanvar	214578	150	
2	Fevral	214545	150	
3	Mart	213694	160	
4	Aprel	235646	160	
5	May	235456	160	
jami				

№26 Variant

O‘qituvchilarning 2005/2006 o‘quv yili yuklamasining bajarish				
	Familiya, ismi, sharifi	Reja	Bajaridi	% xisobi
1	Suyarov A	760	750	
2	Oripov SH	760	755	
3	Masharipov A	840	844	
4	Roipov T	920	920	
5	Uktamov S	920	924	
jami				

№27 Variant

Tashkilotning 2005 yil oylar bo‘yicha umumiy aylanmadan maxalliy byudjetga mablag utkazish xisobi			
	oy	Aylanma summa	Maxalliy byudetga ajratma 15%
1	Yanvar	451254	
2	Fevral	451278	

3	Mart	461247	
4	Aprel	467414	
5	May	467899	
6	Iyun	471245	
7	Iyul	471256	
8	Avgust	471258	
9	Sentabr	478965	
10	Oktabr	478956	
11	Noyabr	481256	
12	Dekabr	471245	

№28 Variant

Suvoqchilar brigadalarining oylik rejadagini bajarishi				
	Brigada nomeri	Reja (kv metr xisobida)	Bajarilgani	Usish xisobida %
1	1	54798	54000	
2	2	34587	34545	
3	3	34578	34123	
4	4	45782	45145	
5	5	45782	44125	
jami				

№ 29 Variant

Firmaning 3chi kvartalda maxsulotni sotishdan olgan daromadi (million sum xisobida)				
	Tushuncha	Yanvar	Fevral	jami
1	Sotish xajmi	178,7	250,15	
2	Sotib olishgan ketgan xarajat	154,5	304,8	
3	Keltirish sarfi	69,6	78,12	
4	foyda			

№ 30Variant

Ishchi odamning umumiy xarajati xisobi				
	1 kunga xarajat sum	2 kunga xarajat sum	3 kunga xarajat sum	jami
Ertalab	1000	950	800	
Obod	2500	3500	2800	
Tushlik	900	600	400	
Kechki ovkat	3000	3000	2500	
Madaniy tadbirlar	3000	5000	1500	
Jami				

Amaliyot ishi №4. Matematik modellashtirishni elektron jadvalidagi grafik usullari.

Agar $q(x)=q_0=10$, $m(x)=20$, $\varphi(x)=0$, $\psi(x)=0$, $\Delta t=0.01$, $nt=250$ bo‘lib $J(x)$ esa quyidagi ko‘rinishlarda berilgan bo‘lsa, sterjen o‘rtasining ($x=0,5$) tebranishini aniqlang va uning grafigini chizing.

1. $J(x)=1+0,1x;$
2. $J(x)=1,5-0,05x;$
3. $J(x)=1+sin(0,5\pi x);$
4. $J(x)=1+cos(0,5\pi x);$
5. $J(x)=1+e^{-2x};$
6. $J(x)=2-e^{-x};$

7. $J(x)=1+x^2-x;$ 8. $J(x)=1+x-x^2;$ 9. $J(x)=1+2x^2-2x;$
10. $J(x)=1+0{,}5\sin(\pi x);$ 11. $J(x)=1-0{,}5\cos(\pi x);$ 12. $J(x)=1+0{,}5\cos(\pi x);$
13. $J(x)=2-1{,}5e^{-x};$ 14. $J(x)=1+1{,}5x^2-x;$ 15. $J(x)=1{,}6+\cos(2\pi x);$
16. $J(x)=3+0{,}3x;$ 17. $J(x)=5{,}5-0{,}07x;$ 18. $J(x)=1+tg(0{,}8\pi x);$
19. $J(x)=1+ctg(0{,}3\pi x);$ 20 . $J(x)=8-e^{-4x};$ 21. $J(x)=12-e^{5x};$
22. $J(x)=1+x^4-x^2;$ 23. $J(x)=8-x-x^5;$ 24. $J(x)=10+2x^2-4x;$
25. $J(x)=1+2\sin(\pi x);$ 26. $J(x)=2-0{,}5\cos(3\pi x);$ 27. $J(x)=6+\cos(8\pi x);$
28. $J(x)=2+1{,}5\ln x;$ 29. $J(x)=6+3{,}5x^2-x;$ 30. $J(x)=3{,}6-\cos(8\pi x);$

Amaliyot ishi №5. Mathcad dasturi muxiti bilan tanishish. Sodda hisoblashlar bajarish.

Variant 1

1. x,u,z o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$\ln\left|\left(x-\sqrt{\sin^3\left(x+\frac{\pi}{3}\right)}\right)\right|x-\frac{y^2-1}{z+\frac{x}{y+1}}\Bigg|+\cos\left[tg^2\left[\frac{1}{\sqrt[3]{z+1}}\right]\right]$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$d=\frac{2m+\sin^2(8+x^3)}{\sqrt[3]{8+x^3}},m=4,a=-5,b=5,h=1.$$

3. x=0,25. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$f(x)=\frac{3}{5}x^5-\frac{1}{2x^4}-\frac{2}{\sqrt[4]{x^3}}+7;$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{(n+1)^4+(n-1)^4}{n^4+10}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_0^{\frac{\pi}{4}}\frac{1}{\cos(x)}dx\to\ln(\sqrt{2}+1)=0.881;\quad\int_1^4 e^x\left(1-\frac{e^{-x}}{x^2}\right)dx=51.13$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int\left(\frac{1}{x^3}+\frac{1}{x^2}+\frac{1}{x}\right)dx\to\frac{-1}{\left(2x^2\right)}-\frac{1}{x}+\ln(x)\int\frac{1}{2x^2-6}dx\to\frac{-1}{6}\cdot\sqrt{3}\cdot a\tanh\left(\frac{1}{3}\cdot x\cdot\sqrt{3}\right)$$

7. Karali integralni hisoblang va natijani solishtiring.

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}e^{-\left(x^2+y^2\right)}\,dx\,dy=3.142$$

Variant 2

1. x,u,t o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Z=\frac{\sqrt[3]{y^4-\log_2|x|}}{10t}-\sin y$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$y=a\lg\left|(b+x)^{1/3}+a\right|+tg75$$

$$a=30{,}01;b=20{,}5;x=1(25)150$$

3. x=0,2Funkstiya hosilasini berilgan qiymatda hisoblang:

$t(x) = \sqrt[4]{x^2 + Inx}$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{\log_a (n+1)!}{\log_a n!} \quad (n > 2,\ a > 1)$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_0^{\frac{\pi}{4}} \frac{1}{\cos(x)}\,dx \to \ln(\sqrt{2}+1) = 0.881;\quad \int_0^1 \sqrt{1+x}\,dx = 1.219$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{\left(x^2-1\right)^2}{x^3}\,dx \to \frac{1}{2}\cdot x^2 - 2\cdot\ln(x) - \frac{1}{\left(2\cdot x^2\right)} \int\left(\frac{1}{\sqrt[3]{x^2}}\right)dx - \int \frac{1}{x\sqrt{x}}\,dx \to 3\cdot\frac{x}{\left(x^2\right)^{\left(\frac{1}{3}\right)}} + \frac{2}{x^{\left(\frac{1}{2}\right)}}$$

7. Karali integralni hisoblang va natijani solishtiring.

$$\int_0^a \int_0^x \int_0^y xyz\,dzdydx \to \frac{1}{6}\cdot a^3 \cdot xyz$$

Variant 3

1. x,to‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Y_2 = \frac{\lg\left|t^2 - x^2\right|}{\cos\frac{\pi}{x^2} - 10{,}3} - \sin t^2$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$z = ax^2 + \left(\frac{ax^2+b}{\cos 42^0}\right)^{3/5}$$

$a = 0{,}02; b = 35; x = 20(-2)10$

3. x=0,5. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\mathrm{g}(\mathrm{x}) = \frac{\mathrm{e}^{\mathrm{x}} - \sin x}{\cos x + \sqrt{x}};$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \sqrt{n}(\ln(n + 2\sqrt{n} + 1) - \ln n)$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_{-2}^{-1} \frac{1}{(11+5x)^3}\,dx = 0.097;\quad \int_2^{13} \frac{1}{\sqrt[5]{(3-x)^4}}\,dx = -3.706$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{\left(2\sqrt{x}+1\right)^2}{x^2}\,dx \to 4\cdot\ln(x) - \frac{8}{x^{\left(\frac{1}{2}\right)}} - \frac{1}{x}\int\left(\frac{1}{x^3} + \frac{1}{x^2} + \frac{1}{x}\right)dx \to \frac{-1}{\left(2x^2\right)} - \frac{1}{x} + \ln(x)$$

7. Karali integralni hisoblang va natijani solishtiring.

$$\int_0^1 \int_0^2 \int_0^3 1\,dxdydz \to 6 = 6$$

Variant 4

1. x,u, o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$B = \frac{|x^3| y^3 + 55{,}5}{\log_3 |x^3 - y^3|} - tg_2 y$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$l = \sqrt{(e^a + \ln|a|)^2 + 1} + \frac{t^2 - 1}{\sin 40^0 * b}$$

$$b = 5; a = 4{,}4$$

$$t = 10(-0{,}1)9$$

3. x=0,8. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{\sqrt{x + 1.2}}{\sqrt{x^2 + 1.2x + 2.4}}$$

4.Quyidagi limitlarni toping:

$$\lim_{n \to \infty} \frac{(n+k)! + n!}{(n+k)! - n!}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int (e^x - 1) \cdot e^x dx = 1.476; \quad \int_0^1 \frac{3}{2 - x} dx = 2.079$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \left(\sin\left(\frac{x}{2}\right) - \cos\left(\frac{x}{2}\right) \right) dx \to -2 \cdot \cos\left(\frac{1}{2} \cdot x\right) - 2 \cdot \sin\left(\frac{1}{2} \cdot x\right)$$

7. Karali integralni hisoblang va natijani solishtiring.

$$\int e^x \left(1 + \frac{e^{-x}}{\cos^2 x}\right) dx \to \exp(x) + \frac{1}{cos^2 x} \cdot \ln(x) \qquad \int_0^a \int_0^x \int_0^{xy} x^3 \cdot y^3 \cdot z \, dz dy dx \to \frac{1}{64} \cdot a^8 \cdot xy^2$$

Variant 5

1. xo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$C = \sqrt{\left| Arc\sin\left(\frac{0{,}4 - x^4}{x^2}\right) + 0{,}6 \right|}$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$z = \sin^{1/3} \left| \frac{2x - a}{a + b} \right| + \sqrt{|b^2 x - a^2|}$$

$$b = 3{,}71; a = 7{,}10$$

$$x = -0{,}1(-1{,}1) - 10$$

3. x=0,3. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{\sin^2 x}{\sqrt{2x^2 + 1}}$$

4.Quyidagi limitlarni toping:

$$\lim_{n \to \infty} \frac{3n^3 + 2}{4n^3 - 1}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_0^1 \frac{x}{x^2+1}dx = 0.347$; $\int_1^{e^3} \frac{1}{x\cdot\sqrt{1+\ln(x)}}dx = 2$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int a^x\left(1+\frac{a^{-x}}{x^5}\right)dx \to \frac{1}{x^4}\cdot\left(\frac{a^x}{\ln(a)}\cdot x^4 - \frac{1}{4}\right)\int \frac{1}{\cos(x)}dx \to \ln(\sec(x)+\tan(x))$

7. Karali integralni hisoblang va natijani solishtiring

$\int_0^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_0^a 1 dz dy dx \to \frac{1}{2}\cdot a\cdot\pi$

Variant 6

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$D = \log_2\left|\frac{x^2}{y^2} - x^2 + y^2\right| + \frac{x^2}{40{,}7}$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$p = \ln|x| + \ln|x^2 + \sin 35^0| + \frac{\sqrt{\left|\sqrt[3]{1-\cos\frac{\pi}{x}}\right|}}{a+n^2}$

$a = -0{,}11; n = 22$

$x = 10(5)50$

3. x=0,6. Funkstiya hosilasini berilgan qiymatda hisoblang:

$\frac{3x+0.5}{\sin x}$

4.Quyidagi limitlarni toping:

$\lim_{n\to\infty} \frac{2n^3+3}{n^3+n-1}$

5. Aniq integralni hisoblang va natijani solishtiring.

. $\int_{-2}^{5} \frac{x^4}{1+x^2}dx = 39.814$; $\int_{-1}^{3} \sqrt{y+1}dy = 5.333$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \sqrt{1+x}dx \to \frac{2}{3}\cdot(x+1)^{\left(\frac{3}{2}\right)}\int \frac{1}{(11+5x)^3} \to \frac{-1}{10\cdot(11+5x)^2}$

7. Karali integralni hisoblang va natijani solishtiring

$\int_0^{e-1}\int_0^{e-x-1}\int_e^{x+y+e} \frac{\ln(z-x-y)}{(x-e)\cdot(x+y-e)}dz dy dx \to 2\cdot\exp(1) - 5 = 0.437$

Variant 7

1. x1,x2o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$E = x_1 - \arccos\frac{x_2 - 10{,}8}{x_2 + 12}$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$s = \frac{ax^2 + bx}{\sqrt{|1 + ax^2|}} + e^{\sin 42^0} \arcsin\frac{x}{a}$$

$a = 10{,}12; b = 30$

$x = 10(-2)0$

3. x=0,7. Funkstiya hosilasini berilgan qiymatda hisoblang:

$\sqrt{x+1}\ln(x+1)$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{(n+1)^3}{5n^3+1}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_1^2 \frac{1}{x+x^2}dx = 0.288\,;\ \int_{\frac{\sqrt{2}}{2}}^1 \frac{\sqrt{1-x^2}}{x^6}dx = 0.533$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{1}{\sqrt[5]{(3-x)}}dx \to \frac{-5}{4}\cdot(3-x)^{\left(\frac{4}{5}\right)}\ \int \frac{(y-1)}{\sqrt{y}+1}dy \to -y + \frac{2}{3}\cdot y^{\left(\frac{3}{2}\right)}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_0^a\int_0^b\int_0^c (x+y+z)\,dzdydx \to \frac{1}{2}\cdot a^2\cdot c\cdot b + \frac{1}{2}\cdot b^2\cdot c\cdot a + \frac{1}{2}\cdot c^2\cdot b\cdot a$$

Variant 8

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$A = \frac{x^2\cdot y^3}{30{,}4 - x^3} + arctg\sqrt[3]{|y^3 - x^2|}$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$p = \frac{i_m^2 r}{2} + \frac{i_m^2 r}{2}\cos 2wt$$

$i_m = 1{,}44; r = 30; w = 45$

$t = 0(0{,}5)3$

3. x=8. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{\ln x}{x\sqrt{1+\ln x}}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{\sqrt[3]{n^2+n}}{4+n}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_1^{\sqrt{3}} \frac{\sqrt{1+x^2}}{x^2}dx = 0.695\,;\ \int_1^2 \frac{\sqrt{x^2-1}}{x}dx = 0.685$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int (e^x - 1)\cdot e^x dx \to -\exp(x) + \frac{1}{2}\cdot\exp(x)^2\ \int \frac{3}{2-x}dx \to -3\cdot\ln(2-x)$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_2^4\int_x^{2x} \frac{y}{x}dydx \to 9 = 9$$

Variant 9

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$F = 50{,}9 - \lg\left|\sqrt{\left|y^4\right|} - x^2\right|$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$y = 2\sin^2 x - a^3 \cos 2x + be^{-4x}$$

$$a = 3{,}15; b = 500;$$

$$x = 2{,}7(-0{,}25)0{,}2$$

3. x=9. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$tgx - ctgx - 2x - tg\frac{\pi}{6} +$$

$$ctg\frac{\pi}{6} + \frac{\pi}{3}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{\sqrt{2n^4 + n^2 + 1}}{2n + n^2 - 1}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_0^1 x^2 \cdot \sqrt{1 - x^2}\,dx = 0.196\,;\ \int_0^{\ln(2)} \sqrt{1 - e^{2x}}\,dx = -0.451$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{x}{x^2 + 1}\,dx \to \frac{1}{2} \cdot \ln(x^2 + 1)\ \int \frac{1}{x \cdot \sqrt{1 + \ln(x)}}\,dx \to 2 \cdot (1 + \ln(x))^{\left(\frac{1}{2}\right)}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-|x|-|y|}\,dxdy \to 4 = 4$$

Variant 10

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$H = \frac{Arctg\,\dfrac{x - y}{3x^2}}{y^2 - 1{,}02}$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$z = \frac{tg60^0 \sqrt{\left|1 + \sqrt[5]{x + a}\right|}}{\arcsin\dfrac{25\pi}{x}} + \lg\left|\frac{x + c}{n}\right|$$

$$a = 500{,}16; c = 25; n = 30$$

$$x = 100(-5)80$$

3. x=0,1. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{\ln^2 x}{x}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{n!}{(n+1)! - n!}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_0^1 \sqrt{\left(1-x^2\right)3}dx = 0.589$; $\int_{\sqrt{2}}^2 \frac{1}{x^5 \cdot \sqrt{x^2-1}}dx = 0.038$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \frac{10x^8+3}{x^4}dx \to 2\cdot x^5 - \frac{1}{x^3}$ $\int \frac{x-2}{x^3}dx \to \frac{-1}{x} + \frac{1}{x^2}$

7. Karali integralni hisoblang va natijani solishtiring

$\int_1^2 \int_0^{\ln y} e^x dxdy \to \exp(\ln y) - 1$

Variant 11

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$G = \frac{x^3 - y^3}{\lg\left|x^2\right|} + 1{,}32$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$y = e^{\cos 57^0} tg\frac{x}{\pi} + \frac{a-x^2}{\sqrt[4]{\left|1+\sin x\right|}}$

$a = 25{,}17$

$x = 3(-0{,}1)2$

3. x=0,11. Funkstiya hosilasini berilgan qiymatda hisoblang:

$2\sqrt{e^x - 1} - 2arctg\sqrt{e^x - 1}$

4.Quyidagi limitlarni toping:

$\lim_{n\to\infty} \sqrt{n}(\sqrt{n+2} - \sqrt{n-3})$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_0^3 \frac{1}{(x^2+3)^{\frac{5}{2}}}dx = 0.072$; $\int_2^6 \frac{10x^8+3}{x^4}dx = 1.549\times 10^4$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int\left(x^2 + 2x + \frac{1}{x}\right)dx \to \frac{1}{3}\cdot x^3 + x^2 + \ln(x)$ $\int \frac{x-1}{\sqrt[3]{x^2}}dx \to \frac{3}{4}\cdot(-4+x)\cdot\frac{x}{\left(x^2\right)^{\left(\frac{1}{3}\right)}}$

7. Karali integralni hisoblang va natijani solishtiring

$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} \frac{1}{1+x^2+y^2}dxdy \to \infty = 1\times 10^{307}$

Variant 12

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$I = \left|\frac{y-x}{21{,}15}\right|^{2x} \ln 13$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$s = (\ln|ax| - c)^{2/3} + \frac{a+b}{\sqrt[3]{cx^2}}$

$a = 10{,}49; c = 0{,}01; b = 100$

$x = 10(7)80$

3. x=1,2. Funkstiya hosilasini berilgan qiymatda hisoblang:

$xe^x \sin x$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{(2n+1)!+(2n+2)!}{(2n+3)!-(2n+2)!}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_1^2 \frac{x-2}{x^3}\,dx = -0.25 \quad \int_1^3 \left(x^2+2x+\frac{1}{x}\right)dx = 17.765$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{\left(x^2+1\right)^2}{x^3}\,dx \to \frac{1}{2}\cdot x^2 + 2\cdot\ln(x) - \frac{1}{\left(2\cdot x^2\right)} \quad \int \left(\sqrt{x}+\sqrt[3]{x}\right)dx \to \frac{2}{3}\cdot x^{\left(\frac{3}{2}\right)} + \frac{3}{4}\cdot x^{\left(\frac{4}{3}\right)}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} \frac{1}{\left(1+x^2+y^2\right)^{\left(\frac{3}{2}\right)}}\,dxdy \to 2\cdot\pi = 6.283$$

Variant 13

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$J = \left|\sqrt{\left|x^2-y^2\right|}\right| - x + 21{,}2$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$x = \frac{t-1}{at^2+bt} + \lg\left|t^2-b^2\right|$$

$$a = 0{,}2; b = 2$$

$$t = -10(3)10$$

3. x=1,3. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{xe^x(\sin x-\cos x)+e^x\cos x-1}{2}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \sqrt{n^3+8}\left(\sqrt{n^3+2}-\sqrt{n^3-1}\right)$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_3^6 \frac{x-1}{\sqrt[3]{x^2}}\,dx = 3.807 \; ; \; \int_1^3 \frac{\left(x^2+1\right)^2}{x^3}\,dx = 6.642$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{\left(\sqrt{x}-1\right)^3}{x}\,dx \to \frac{2}{3}\cdot x^{\left(\frac{3}{2}\right)} - 3x + 6\cdot x^{\left(\frac{1}{2}\right)} - \ln(x) \quad \int e^x\left(1-\frac{e^{-x}}{x^2}\right)dx \to \exp(x) + \frac{1}{x}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int\int 3\,dxdy \to 3\cdot x\cdot y$$

Variant 14

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$K = \frac{\sqrt{2^x+4^y}}{1{,}3x * \lg\left|\frac{y}{2}\right|}$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$y = (a + \ln|x| + \lg|x|)^3 + \frac{x}{b+x}$$

$a = 40{,}22; b = 15$

$x = 10(10{,}5)115$

3. x=14. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{x(e^x + e^{-x})}{2} - \frac{e^x - e^{-x}}{2}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\left(\frac{n}{n^2+1}Sinn! + \frac{2n^2}{1-9n^2}\right)$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_2^5\left(\sqrt{x} + \sqrt[3]{x}\right)dx = 10.09\ ;\ \int_1^3 \frac{\left(\sqrt{x}-1\right)^3}{x}dx = 0.091$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{x^4}{1+x^2}dx \to \frac{1}{3}\cdot x^3 - x + a\tan(x)\ \int\sqrt{y+1}dy \to \frac{2}{3}\cdot(y+1)^{\left(\frac{3}{2}\right)}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int\int xdxdy \to \frac{1}{2}\cdot x^2\cdot y$$

Variant 15

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$L = \log_5\left|x^2 - y^2\right| - 11{,}5$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$t = \left(\frac{1-ax^2}{1+a^2}\right)^3 + \frac{\sqrt{b^2\sin 52^0}}{\sqrt{a\cos 52^0}}$$

$a = 70{,}23; b = 10{,}15$

$x = 15{,}5(0{,}2)17{,}5$

3. x=15,3. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\ln(x + \sqrt{x^2+9}) - \ln 3$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{4n-1}{5n+1}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_1^4 e^x\left(1 - \frac{e^{-x}}{x^2}\right)dx = 51.13\ ;\ \int_{-2}^5 \frac{x^4}{1+x^2}dx = 39.814$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{x}{\sqrt{x-1}}dx \to 2\cdot(x-1)^{\left(\frac{1}{2}\right)} + \frac{2}{3}\cdot(x-1)^{\left(\frac{3}{2}\right)}\ \int \frac{1}{\sqrt{1+x-x^2}}dx \to a\sin\left[\frac{2}{5}\cdot\sqrt{5}\cdot\left(x - \frac{1}{2}\right)\right]$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int\int \frac{x^2}{7x\cdot y}dxdy \to \frac{1}{14}\cdot x^2\cdot \ln(y)$$

Variant 16

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$M=\frac{\sqrt{\left|\sin^2 39^\circ - x^3\right|}}{y^2-31{,}62}$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$s=\sqrt[3]{b^2-tg47^0}+\frac{\sin\frac{\pi}{x}-ax^2}{1+a^2}$$

$$a=-12{,}24; b=7{,}77$$

$$x=5{,}5(-0{,}1)4$$

3. x=0,5. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{x^2}{2}arctgx-\frac{x}{2}+\frac{1}{2}arctgx$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{\sqrt{n^2+n}}{n}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_{-1}^{3}\sqrt{y+1}dy=5.333;\ \int_{1}^{6}\frac{x}{\sqrt{x-1}}dx=11.926$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int\frac{1}{\sqrt{2-x^2}}dx\to a\sin\left(\frac{1}{2}\cdot\sqrt{2}\cdot x\right)\int a\sin(x)dx\to x\cdot a\sin(x)+\left(1-x^2\right)^{\left(\frac{1}{2}\right)}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_0^a\int_0^x\int_0^y xyz\,dzdydx\to\frac{1}{6}\cdot a^3\cdot xyz$$

Variant 17

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$N=1{,}73-\log_{3/2}\left|x^3-y\right|$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$m=\frac{\left(e^{a^2}+c\right)^{1/3}}{\sin 40^0+a}+\lg|x-b|\ln|x-b|$$

$$b=3{,}24; c=30; a=2{,}25$$

$$x=100(-2)80$$

3. x=1. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$x\arcsin\sqrt{\frac{x}{1+x}}-\sqrt{x}+arctg\sqrt{x}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{3n^3-4}{n^3+6}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_5^9 \frac{1}{\sqrt{1+x-x^2}}\,dx = -0.647i\ ;\quad \int_{-1}^{2} \frac{1}{\sqrt{2-x^2}}dx = 2.356 - 0.881i$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{x-2}{\sqrt{x^3}}\,dx \to 2\cdot(x+2)\cdot\frac{x}{\left(x^3\right)^{\left(\frac{1}{2}\right)}}$$

$$\int x^2\cdot\sqrt{x^2+4}dx \to \frac{1}{4}\cdot x\cdot(x^2+4)^{\left(\frac{3}{2}\right)} - \frac{1}{2}\cdot x\cdot(x^2+4)^{\left(\frac{1}{2}\right)} - 2\cdot a\sinh\left(\frac{1}{2}\cdot x\right)$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_0^1\int_0^2\int_0^3 1\,dxdydz \to 6 = 6$$

Variant 18

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$P = \sin\pi/1{,}8 + \frac{3y+x^2}{x-20}$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$l = \frac{1-a^2t}{1+c^2} + \arcsin\left(\frac{61+t^3}{4t^3}\right)$$

$a = 10{,}26; c = 7$

$t = 5{,}1(0{,}15)6{,}6$

3. x=18. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{1}{\sqrt{2}}\ln\frac{x+0{,}75+\sqrt{(x+0{,}75)^2-0{,}0625}}{0{,}75+\sqrt{0{,}5}}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{n^2+n+1}{(n+1)^2}$$

5. Aniq antegralni hisoblang va natijani solishtiring.

$$\int_0^{\pi} a\sin(x)dx = 3.935 - 2.713i\ ;\quad \int_3^4 \frac{x-2}{\sqrt{x^3}}dx = 0.226$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{\cos 2x}{\cos(x)\cdot\sin(x)}dx \to \ln(\tan(x))\cdot\cos 2x\ \int \frac{1-\left(\sin(x)\right)^3}{\sin(x)\cdot\sin(x)}\,dx \to \frac{-1}{\sin(x)}\cdot\cos(x) + \cos(x)$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_0^a\int_0^x\int_0^{xy} x^3\cdot y^3\cdot z\ dzdydx \to \frac{1}{64}\cdot a^8\cdot xy^2$$

Variant 19

1. xo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$R = \lg\left|y^3 - \sin x + \frac{x^2}{31{,}94}\right|$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$n=\frac{r^3}{k-x}+\lg(x^2)+\sqrt{\left|\frac{1+\cos 73^0}{ka}\right|}$$

$r=12{,}5; k=35; a=0{,}27$

$x=100(-5{,}5)45$

3. x=0,56. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{xarctgx}{\sqrt{1+x^2}}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{(n+1)^4+(n-1)^4}{n^4+10}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_1^5\sqrt{x-1}dx;\ \int_1^2\frac{dx}{x^2-4x+5}$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int\frac{\sqrt[3]{1+\sqrt[4]{x}}}{\sqrt{x}}dx\to\frac{12}{7}\cdot\left[1+x^{\left(\frac{1}{4}\right)}\right]^{\left(\frac{7}{3}\right)}-3\cdot\left[1+x^{\left(\frac{1}{4}\right)}\right]^{\left(\frac{4}{3}\right)}\ \int\frac{1}{x\cdot\sqrt{x^2-1}}dx\to-\tan\left[\frac{1}{\left(x^2-1\right)^{\left(\frac{1}{2}\right)}}\right]$$

7. Karali integralni hisoblang va natijani solis htiring

$$\int_0^1\int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}}\int_0^a 1dzdydx\to\frac{1}{2}\cdot a\cdot\pi$$

Variant 20

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$S=\sqrt[5]{\left|x-\sqrt[3]{x^2}\right|}+\frac{2{,}02}{y}$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$t=arctg\frac{y^2+10}{y^3-20}+\frac{ax^2+y}{x^2-y}$$

$a=10{,}28; y=3{,}7$

$x=10(-0{,}5)5$

3. x=0,45. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\sqrt{1+x^2}arctgx-\ln(x+\sqrt{1+x^2})$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{\sqrt[3]{4n^3+2n-1}}{2n+2}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_{-1}^4\frac{x}{\sqrt{x+5}}dx;\ \int_1^e\frac{\sqrt[3]{1+\ln x}}{x}dx$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{1}{2x^2-6}\,dx \to \frac{-1}{6}\cdot\sqrt{3}\cdot a\tanh\left(\frac{1}{3}\cdot x\cdot\sqrt{3}\right) \int x^2\cdot\ln(x)dx \to \frac{1}{3}\cdot x^3\cdot\ln(x)-\frac{1}{9}\cdot x^3$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_0^{e-1}\int_0^{e-x-1}\int_e^{x+y+e} \frac{\ln(z-x-y)}{(x-e)\cdot(x+y-e)}\,dzdydx \to 2\cdot\exp(1)-5=0.437$$

Variant 21

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$T = tg13^\circ - \log_{3/2}\left|y^2-x^3\right|+12{,}1$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$z = \lg\left|t^7\right|+\sqrt{\left|1+a^2t\right|}+b\sin^2 41^0$$

$$a = 3{,}29; b = 35$$

$$t = 25(1)35$$

3. x=21. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{e^{3x}+1}{e^x+1}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{\sqrt{2n^2+1}}{\sqrt[4]{n^4+3n-1}}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_0^1 \frac{xdx}{\sqrt{1-x^2}}\,;\ \int_0^1 \frac{dx}{\sqrt{4-x^2}}$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{1}{\sqrt[3]{5x}}\,dx \to \frac{3}{10}\cdot x^{\left(\frac{2}{3}\right)}\cdot\sqrt[3]{5^2}\int \frac{1}{\sqrt{3-4t^2}}dt \to \frac{1}{2}\cdot a\sin\left(\frac{2}{3}\cdot t\cdot\sqrt{3}\right)$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_0^a\int_0^b\int_0^c (x+y+z)\,dzdydx \to \frac{1}{2}\cdot a^2\cdot c\cdot b+\frac{1}{2}\cdot b^2\cdot c\cdot a+\frac{1}{2}\cdot c^2\cdot b\cdot a$$

Variant 22

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$U = arctg\sqrt{\left|x-\sqrt[4]{x^2+y^3}\right|}-12{,}21$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$p = \frac{t^2-a^2}{c^2}+\sin\left(\sqrt{\left|\frac{1+c^2}{t}\right|}+a\right)$$

$$a = 0{,}30; c = 7$$

$$t = -1{,}5(0{,}5)3$$

3. x=22. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{e^{2x}}{2}-e^x+x+0{,}5$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{(n+1)!+n!}{(n+2)!}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_0^{\pi/4} \sin 4x dx$; $\int_1^e x^2 \ln x dx$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \frac{2x}{x^4+3} dx \to \frac{1}{3} \cdot \sqrt{3} \cdot a \tan\left(\frac{1}{3} \cdot x^2 \cdot \sqrt{3}\right)$ $\int \frac{2x+3}{x^2-5} dx \to \ln(x^2-5) - \frac{3}{5} \cdot \sqrt{5} \cdot a \tanh\left(\frac{1}{5} \cdot x \cdot \sqrt{5}\right)$

7. Karali integralni hisoblang va natijani solishtiring

$\int_2^4 \int_x^{2x} \frac{y}{x} dy dx \to 9 = 9$

Variant 23

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$V = \cos\left(\log_5 \left|\frac{x}{y}\right|\right) - 22{,}23$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$s = \frac{ax^2 + bx}{\sqrt{|1 + ax^2|}} + e^{\sin 42^0} \arcsin \frac{x}{a}$

$a = 10{,}12; b = 30$

$x = 10(-2)0$

3. x=23. Funkstiya hosilasini berilgan qiymatda hisoblang:

$\frac{x}{2} - \frac{1}{4} \sin 2x$

4.Quyidagi limitlarni toping:

$\lim_{n \to \infty} \left(\frac{1}{n} Cos \frac{n\pi}{2} + 1\right)$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_0^{\pi} e^x \sin x dx$; $\int_0^1 \arcsin x dx$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \frac{\sin(x)}{\sqrt{1+2\cos(x)}} dx \to -\left(1 + 2 \cdot \cos(x)\right)^{\left(\frac{1}{2}\right)}$ $\int \frac{x}{\sqrt[3]{x^2+a}} dx \to \frac{3}{4} \cdot \left(x^2 + a\right)^{\left(\frac{2}{3}\right)}$

7. Karali integralni hisoblang va natijani solishtiring

$\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} e^{-|x|-|y|} dx dy \to 4 = 4$

Variant 24

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$W = \lg\left|y^3\right| \frac{3x^2 - 2{,}43}{x^4}$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$l = \frac{tg47^0 \arccos\frac{\pi}{x}}{\sqrt{1+\sqrt{\left|\frac{a-c}{x}\right|}}}$$

$a = 50{,}13; c = 5{,}13$

$x = 10(-0{,}4)6$

3. x=0,37Funkstiya hosilasini berilgan qiymatda hisoblang:

$$2\arcsin\frac{x}{2} - \frac{1}{2}\sin(4\arcsin\frac{x}{2})$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{(n+k)!+n!}{(n+k)!-n!}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_0^1 \ln(x+1)dx;\ \int_0^{\pi/2}\sin x\cos^2 xdx$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int\frac{\sqrt{1+\ln(x)}}{x}dx \to \frac{2}{3}\cdot\left(1+\ln(x)\right)^{\left(\frac{3}{2}\right)}\ \int\frac{1}{\sqrt{e^y+1}}dy \to -2\cdot a\tanh\left[\left(\exp(y)+1\right)^{\left(\frac{1}{2}\right)}\right]$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_1^2\int_0^{\ln y} e^x dxdy \to \exp(\ln y) - 1$$

Variant 25

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Y = arctg\frac{y^2-x^2}{2x+y} - \frac{x^2}{52{,}57}$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$p = \frac{i_m^2 r}{2} + \frac{i_m^2 r}{2}\cos 2wt$$

$i_m = 1{,}44; r = 30; w = 45$

$t = 0(0{,}5)3$

3. x=34 Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{x^3}{27}(9\ln^2 x - 6\ln x + 2) - \frac{2}{27}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{2n^3+3}{n^3+n-1}$$

$$\int_0^1\frac{dx}{e^x+1};\ \int_0^4\frac{dx}{1+\sqrt{2x+1}}$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

. $$\int\frac{10x^8+3}{x^4}dx \to 2\cdot x^5 - \frac{1}{x^3}\int\frac{x-2}{x^3}dx \to \frac{-1}{x} + \frac{1}{x^2}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\frac{1}{1+x^2+y^2}dxdy \to \infty = 1\times 10^{307}$$

Variant 26

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Z=\frac{72{,}67}{x^2}-arctg\frac{x-y^3}{10+y}$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$z=\frac{tg60^0\sqrt{\left|1+\sqrt[5]{x+a}\right|}}{\arcsin\frac{25\pi}{x}}+\lg\left|\frac{x+c}{n}\right|$$

$a=500{,}16; c=25; n=30$

$x=100(-5)80$

3. x=0,35. Funkstiya hosilasini berilgan qiymatda hisoblang:

$e^x\cos^2 x$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{\sqrt[3]{n^2+n}}{4+n}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_0^1\frac{x^2dx}{\sqrt{4-x^2}};\quad \int_0^1\sqrt{1+x^2}dx$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int\left(x^2+2x+\frac{1}{x}\right)dx \to \frac{1}{3}\cdot x^3+x^2+\ln(x) \qquad \int\frac{x-1}{\sqrt[3]{x^2}}dx \to \frac{3}{4}\cdot(-4+x)\cdot\frac{x}{\left(x^2\right)^{\left(\frac{1}{3}\right)}}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\frac{1}{\left(1+x^2+y^2\right)^{\left(\frac{3}{2}\right)}}dxdy \to 2\cdot\pi = 6.283$$

Variant 27

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Z_1=\frac{\log_3\left|y^3\right|-\log_2\left|x^2\right|}{\log x+12{,}73}$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$p=\left(\frac{t\arcsin\frac{a}{b}}{y^3+b}\right)^3-\sqrt[7]{\sin^2 ta}$$

$y=15; b=20; a=-0{,}18$

$t=15;-4;42;12{,}4;-3{,}48;-0{,}77;-6;9$

3. x=0,27. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{x^3}{27}(9\ln^2 x-6\ln x+2)-\frac{2}{27}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{(2n+1)!+(2n+2)!}{(2n+3)!-(2n+2)!}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_1^3 \frac{dx}{x+x^2};\ \int_1^2 \frac{dx}{2x-1}$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{1}{\cos(x)}dx \to \ln(\sec(x)+\tan(x))\ \int \sqrt{1+x}dx \to \frac{2}{3}\cdot(x+1)^{\left(\frac{3}{2}\right)}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int\int 3dxdy \to 3\cdot x\cdot y$$

Variant 28

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Z_3 = \arcsin\frac{2}{y^2} + 2{,}8 * \ln\left|x^4\right|$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$l = \sqrt{(e^a + \ln|a|)^2 + 1} + \frac{t^2-1}{\sin 40^0 * b}$$

$$b = 5; a = 4{,}4$$

$$t = 10(-0{,}1)9$$

3. x=23. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{x^2-1}{(x^2+1)\sqrt{x^4+1}}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\left(\frac{1}{2n}Cos\,n^3 - \frac{3n}{6n+1}\right)$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_1^e \frac{dx}{x(1+\ln^2 x)};\ \int_1^e x\arcsin x dx$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{1}{(11+5x)^3} \to \frac{-1}{10\cdot(11+5x)^2}\ \int \frac{1}{\sqrt[5]{(3-x)}}dx \to \frac{-5}{4}\cdot(3-x)^{\left(\frac{4}{5}\right)}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int\int xdxdy \to \frac{1}{2}\cdot x^2\cdot y$$

Variant 29

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Z_4 = 2{,}93l^{\cos x^3} + \frac{x^2-y}{y^3}$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$$b=(y^2+1)^{1/7}-\left(\frac{\arcsin\frac{x}{y}}{a^2x+t}\right)^2$$

$y=31; a=2{,}06; t=18$

$x=30(-10)-30$

3. x=0,59. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$\frac{e^x(1+\sin x)}{1+\cos x}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{\sqrt{n^2+n}}{n}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_2^3\frac{dx}{x^2};\quad\int_0^{\sqrt{3}}\frac{xdx}{\sqrt{4-x^2}}$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int(e^x-1)\cdot e^x dx\to-\exp(x)+\frac{1}{2}\cdot\exp(x)^2\quad\int\frac{3}{2-x}dx\to-3\cdot\ln(2-x)$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int\int\frac{x^2}{7x\cdot y}dxdy\to\frac{1}{14}\cdot x^2\cdot\ln(y)$$

Variant 30

1. x,uo‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Z_2=\frac{x^2+3{,}02}{\ln\left|y^2-x^3\right|}$$

2. [a,b] oraliqda hqadam bilan funkstiya qiymatlari jadvalini hosil qiling.

$y=a\lg\left|(b+x)^{1/3}+a\right|+tg75$

$a=30{,}01; b=20{,}5; x=1(25)150$

3. x=24. Funkstiya hosilasini berilgan qiymatda hisoblang:

$$e^x tg\frac{x}{2}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{3n^3-4}{n^3+6}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_{\frac{\pi}{8}}^{\frac{\pi}{6}}\frac{dx}{\cos^2 2x};\quad\int_1^4\frac{dx}{(1+\sqrt{x})^2}$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int\frac{x}{x^2+1}dx\to\frac{1}{2}\cdot\ln(x^2+1)\quad\int\frac{1}{x\cdot\sqrt{1+\ln(x)}}dx\to2\cdot(1+\ln(x))^{\left(\frac{1}{2}\right)}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-|x|-|y|}dxdy \to 4 = 4$$

Amaliyot ishi №6. Mathcad paketida vektorlar va matritsalar ustida ish olib borish.

Variant 1

1) Ifodani soddalashtiring:

$$\sqrt{43+24\sqrt{3}}+\sqrt{43-24\sqrt{3}};$$

$$\left(\frac{x^3-8}{x^2+4+2x}+4\right)\cdot\frac{1}{x+2};$$

2) Ko‘paytuvchilarga ajrating: $8a^3+12a^2b-6ab^2+b^3$; $2a^3-12a^2b+6ab^2-b^3$

3) Sodda kasrlarga ajrating:

$$\frac{x^3+1}{x^3-5x^2+6x} \qquad \left(\frac{x}{x^2-3x+2}\right)^2$$

4) Tenglama va tengsizlikni eching: $\log_4(x-2)+\log_{\frac{1}{2}}(x-2)=\frac{1}{2}$; $g_3(1-x) > \log_3(3-2x)$;

5) Hosilani hisoblang: $y=\left(2x^2-7\right)\ln\left(x-1\right),\quad y^V=?$

6) Matristalar ustida amallarni bajaring:

$$A=\begin{pmatrix}1&2&1&3&3\\3&4&-2&6&8\\1&2&1&8&4\end{pmatrix} \qquad B=\begin{pmatrix}1&0&2&5&3\\0&1&0&2&-5\\2&0&4&0&0\end{pmatrix}$$

3A+2B=? A^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases}3x+2y+\ z=5\\ \ x+\ \ y-\ z=0\\4x-\ \ y+5z=3\end{cases}$$

Variant 2

1) Ifodani soddalashtiring:

$$\frac{2+\sqrt{3}}{\sqrt{2}+\sqrt{2+\sqrt{3}}}+\frac{2-\sqrt{3}}{\sqrt{2}-\sqrt{2-\sqrt{3}}};$$

$$\left(\frac{x^2-y^2}{x-y}-\frac{x^2+y^2}{x+y}\right)\cdot\frac{x^2-y^2}{2xy}.$$

2) Ko‘paytuvchilarga ajrating:

$2a^3-4a^2b-6ab^2+b^3$ $\qquad 2a^3+12a^2b-6ab^2+b^3$

3) Sodda kasrlarga ajrating:

$$\frac{x^2+5x+4}{x^4+5x^2+4};\ \frac{1}{(x^4-1)^2};$$

4) Tenglama va tengsizlikni eching: $\log_{\frac{1}{2}}(2x+5) > -3;$ $\left(\frac{1}{125}\right)^{0,2x+1} = 25$

5) Hosilani hisoblang: $y = \frac{\log_2 x}{x^3},\ y^{III} = ?$

6) Matristalar ustida amallarni bajaring:

$$A = \begin{pmatrix} 47 & -67 & 35 & 201 & 4 \\ 26 & 98 & 23 & -294 & 6 \\ 16 & -428 & 451 & 1284 & 52 \end{pmatrix} \quad B = \begin{pmatrix} 1 & 56 & 5 & 8 & 9 & 4 \\ 3 & 21 & 15 & 24 & 42 & 6 \\ 2 & 14 & 10 & 16 & 18 & 4 \end{pmatrix}$$

3A-2B=? B^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} 2x_1 + x_2 - x_3 = 5 \\ 3x_1 - x_2 + 2x_3 = -5 \\ 7x_1 + x_2 - x_3 = 10 \end{cases}$$

Variant 3

1) Ifodani soddalashtiring:

$$\frac{20a^2-80b^2}{a^2-4ab+4b^2} \qquad \frac{20(a-2b)}{a+2b}$$

2) Ko‘paytuvchilarga ajrating:

$5ax^2-10ax-bx+2b-x+2 \qquad 2a^3+12a^2b-6ab^2+b^3$

3) Sodda kasrlarga ajrating:

$$\frac{3x}{x^2+4x} \qquad \frac{2x^6+3x^3-1}{3x^4+8x^3-33x^2-62x+24}$$

4) Tenglama va tengsizlikni eching: $\log_{\frac{1}{7}}(2x+5) - \log_{\frac{1}{7}} 6 = \log_{\frac{1}{7}} 2\ ;$ $\left(\frac{1}{4}\right)^x - (2)^{1-x} - 8 < 0$

5) Hosilani hisoblang: $y = x^2 \sin(5x-3),\ y^{III} = ?$

6) Matristalar ustida amallarni bajaring:

$$B = \begin{pmatrix} 1 & -3 & 3 & 5 \\ 2 & 4 & 6 & 8 \\ 3 & 7 & 9 & 12 \end{pmatrix} \qquad C = \begin{pmatrix} 2- & 2 & 3 & 5 \\ 2 & 3 & 1 & 6 \\ 3 & 1 & 2 & 6 \end{pmatrix}$$

C+2B=? C^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} 2x-3y+z = 2 \\ x+5y-4z = -5 \\ 4x+y-3z = -4 \end{cases}$$

Variant 4

1) Ifodani soddalashtiring:

$$\frac{20(a+2b)}{a-2b} \qquad \frac{20a^2-80b^2}{a^2-4ab+4b^2}$$

2) Ko‘paytuvchilarga ajrating:
$2x^4 + x^3 - 20x^2 - 13x + 30$ $x^4 + x^3 - 19x^2 + 11x + 30$
3) Sodda kasrlarga ajrating:
$$\frac{x^6 - 10x + 2}{3x^4 - 7x^3 - 13x^2 + 23x - 6}$$
4) Tenglama va tengsizlikni eching:
$\log_7(2x + 5) = 2$; $\log_3(1 - x) > \log_3(3 - 2x)$;
5) Hosilani hisoblang: $y = (2x+3)\ln^2 x, \quad y^{III} = ?$
6) Matristalar ustida amallarni bajaring:
$$C = \begin{pmatrix} 1 & 0 & 6 \\ -56 & 1 & 0 \\ -1 & 2 & 4 \end{pmatrix} \qquad D = \begin{pmatrix} 3 & 2 & 6 \\ 1 & 3 & 1 \\ 5 & -2 & 4 \end{pmatrix}$$

2C-D=? D^T=?
7) Tenglamalar sistemasini teskari matrista usulida eching:
$$\begin{cases} x_1 + x_2 + x_3 = 2 \\ 3x_1 + 2x_2 + 2x_3 = 1 \\ 4x_1 + 3x_2 + 3x_3 = 4 \end{cases}$$

Variant 5

1) Ifodani soddalashtiring:
$$\frac{1}{3+\sqrt{7}} + \frac{1}{3-\sqrt{7}} \qquad \frac{a^3 - 1}{(a^3 - a)(a^2 + a + 1)}$$
2) Ko‘paytuvchilarga ajrating:
$x^4 - 12x^3 - 3x^2 + 178x - 264$ $3x^4 + 8x^3 - 33x^2 - 62x + 24$
3) Sodda kasrlarga ajrating:
$$\frac{3x^5 + 8x^4 + 2x}{6x^4 - 11x^3 - 30x^2 + 29x - 6}$$
4) Tenglama va tengsizlikni eching:
$\left(\log_{\frac{1}{2}} x\right)^2 - \log_{\frac{1}{2}} x = 6$; $\frac{(x+1)(x+3)^2}{x+4} \le 0.$
5) Hosilani hisoblang: $y = (1 + x^2)\operatorname{arctg} x, \quad y^{III} = ?$
6) Matristalar ustida amallarni bajaring:
$$A = \begin{pmatrix} -6 & 2 & 7 \\ 3 & 2 & -4 \\ 2 & -1 & 0 \end{pmatrix} \qquad B = \begin{pmatrix} 21 & 0 & 7 \\ 4 & -2 & -1 \\ 2 & 5 & 3 \end{pmatrix}$$

2A+3B=? A^T=?
7) Tenglamalar sistemasini teskari matrista usulida eching:
$$\begin{cases} x_1 + x_2 - 2x_3 = -7 \\ 3x_1 - 3x_2 + x_3 = 12 \\ 5x_1 - x_2 - 4x_3 = -5 \end{cases}$$

Variant 6

1) Ifodani soddalashtiring:

$$\frac{xy^{\frac{1}{2}}-x^{\frac{1}{2}}}{x^{\frac{1}{2}}y-y^{\frac{1}{2}}} \qquad \frac{a^2-2ab+b^2-49}{a-b-7}$$

2) Ko‘paytuvchilarga ajrating:

$3x^4-7x^3-13x^2+23x-6$ $\quad 6x^4-11x^3-30x^2+29x-6$

3) Sodda kasrlarga ajrating:

$$\frac{x^6+2x^2}{2x^4+x^3-20x^2-13x+30}$$

4) Tenglama va tengsizlikni eching: $\log_{0,4}(6-x)=-1;$ $\quad \left(\frac{1}{2}\right)^x+\left(\frac{1}{2}\right)^{x-2}>5$

5) Hosilani hisoblang: $y=(4x+3)\cdot 2^{-x},\ \ y^V=?$

6) Matristalar ustida amallarni bajaring:

$$C=\begin{pmatrix} 45 & 19 & 36 & 72 & 8 \\ 49 & 40 & 73 & 147 & -80 \\ 73 & 59 & 98 & 219 & -118 \\ 47 & 36 & 71 & 141 & -72 \end{pmatrix} \qquad R=\begin{pmatrix} -4 & -67 & 35 & 201 & 8 \\ 26 & 5 & 23 & -294 & 6 \\ 16 & -428 & 1 & 24 & 52 \\ 78 & -333 & 41 & 2541 & 12 \end{pmatrix}$$

3C-3R=? $\quad R^T=?$

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} 2x_1+3x_2+11x_3+5x_4=2 \\ x_1+x_2+5x_3+2x_4=1 \\ 2x_1+x_2+3x_3+2x_4=-3 \\ 3x_1+x_2+3x_3+4x_4=-7 \end{cases}$$

Variant 7

1) Ifodani soddalashtiring: $\left(\left(\sqrt[4]{p}-\sqrt[4]{q}\right)^{-2}+\left(\sqrt[4]{p}-\sqrt[4]{q}\right)^{-2}\right):\frac{\sqrt{p}-\sqrt{q}}{p-q}$ $\quad (3x^4-x)-(x^4+3x)-(1-4x)$

2) Ko‘paytuvchilarga ajrating: $3x^2+10xy-8y^2-8x+10y-3;$

3) Sodda kasrlarga ajrating: $\frac{195\cdot 41+5\cdot 41}{465\cdot 82-245\cdot 82}$

4) Tenglama va tengsizlikni eching: $\log_4(x-2)+\log_{\frac{1}{2}}(x-2)=\frac{1}{2}$; $\quad \frac{(x+1)(x+3)^2}{x+4}\le 0.$

5) Hosilani hisoblang: $y=e^{1-2x}\cdot\sin(2+3x),\ \ y^{IV}=?$

6) Matristalar ustida amallarni bajaring:

$$A=\begin{pmatrix} 1 & 2 & 3 & 9 \\ 4 & 4 & 6 & 8 \\ 3 & 3 & 9 & 12 \end{pmatrix} \qquad B=\begin{pmatrix} 1 & 5 & 3 & 9 \\ 1 & 3 & 1 & 6 \\ 3 & 1 & 2 & 6 \end{pmatrix}$$

A+2B=? $\quad B^T=?$

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} 3x_1 + 4x_2 + x_3 + 2x_4 + 3 = 0 \\ 3x_1 + 5x_2 + 3x_3 + 5x_4 + 6 = 0 \\ 6x_1 + 8x_2 + x_3 + 5x_4 + 8 = 0 \\ 3x_1 + 5x_2 + 3x_3 + 7x_4 + 8 = 0 \end{cases}$$

Variant 8

Ifodani soddalashtiring:

$$\frac{x^5 + x^3}{x^4 - x^2} \cdot \frac{x^5 - x^5}{x^2 + x^4} \qquad \frac{5a^{22} + 10ab + 5b^2}{15a^2 - 15b^2}$$

2) Ko‘paytuvchilarga ajrating:

$(mx - n)(mx^3 + 2x + 1)$ $\qquad m^2x^4 - mnx^3 + 2mx^2 - 2nx - n + mx$

3) Sodda kasrlarga ajrating:

$$\frac{x^8}{x^4 + x^3 - 19x^2 + 11x + 30}$$

4) Tenglama va tengsizlikni eching:

$\sin 4x = \frac{\sqrt{3}}{2}$. $\qquad \log_{\frac{1}{2}}(2x + 5) > -3;$

5) Hosilani hisoblang: $y = (2x^3 + 1)\cos x, \quad y^V = ?$

6) Matristalar ustida amallarni bajaring:

$$A = \begin{pmatrix} 1 & -1 & 10 \\ 5 & 41 & -34 \\ 27 & 13 & 24 \end{pmatrix} \qquad B = \begin{pmatrix} 2 & 5 & 10 \\ 6 & -5 & 4 \\ 2 & -2 & -3 \end{pmatrix}$$

3A-B=? $\quad A^T$=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} 2x - y + 3z = 9 \\ 3x - 5y + z = -4 \\ 4x - 7y + z = 5 \end{cases}$$

Variant 9

1) Ifodani soddalashtiring:

$$\frac{(5\sqrt{3} + \sqrt{50})(5 - \sqrt{24})}{\sqrt{75} - 5\sqrt{2}} \qquad \frac{m^2 - n^2}{m - n} - \frac{m^3 - n^3}{m^2 - n^2}$$

2) Ko‘paytuvchilarga ajrating:

$(nx - m)(mx^3 - 2x + 1)$ $\qquad (m - nx)(mx^3 - 2x + 1)$

3) Sodda kasrlarga ajrating:

$$\frac{x^6 + 5x^3 - x + 4}{x^4 - 12x^3 - 3x^2 + 178x - 264}$$

4) Tenglama va tengsizlikni eching:

$\log_2(2x - 4) = 7;$ $\qquad \log_{\frac{1}{2}}(2x + 5) > -3;$

5) Hosilani hisoblang: $y = (x^2 + 3)\ln(x - 3), \quad y^{IV} = ?$

6) Matristalar ustida amallarni bajaring:

$$A=\begin{pmatrix}2 & 1 & -2 & 11\\ -2 & 0 & -4 & 7\\ -4 & 3 & 1 & -1\end{pmatrix} \qquad B=\begin{pmatrix}2 & -1 & 3 & 11\\ 1 & -2 & 5 & 1\\ 2 & -1 & 1 & 8\end{pmatrix}$$

A-2B=? B^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases}2x-5y+3z+t=5\\ 3x-7y+3z-t=-1\\ 5x-9y+6z+2t=7\\ 4x-6y+3z+t=8\end{cases}$$

Variant 10

1) Ifodani soddalashtiring:

$$\left(\frac{(5x)^3-(7y)^3}{(5x)^2-(7y)^2}+\frac{1}{(5x)^{-1}+(7y)^{-1}}\right)(5x+7y)^{-1}+\frac{x^2-14x+24}{x-2}$$

2) Ko‘paytuvchilarga ajrating:

$(mx-n)(mx^3-2x-1)$ $(nx-m)(mx^3+2x+1)$

3) Sodda kasrlarga ajrating:

$$\frac{1}{(x+1)\cdot(x^2+1)} \qquad \frac{a+x}{(x-a)\cdot(x+b)}$$

4) Tenglama va tengsizlikni eching:

$\log_{\frac{1}{7}}(2x+5)-\log_{\frac{1}{7}}6=\log_{\frac{1}{7}}2$; $\left(\frac{1}{2}\right)^x+\left(\frac{1}{2}\right)^{x-2}>5$;

5) Hosilani hisoblang: $y=\frac{\ln(2x+5)}{2x+5}$, $y^{III}=?$

6) Matristalar ustida amallarni bajaring:

$$A=\begin{pmatrix}1 & 3 & 5 & 12\\ 2 & -1 & -3 & 4\\ 5 & 4 & -1 & 7\\ 7 & 7 & 9 & 1\end{pmatrix} \qquad B=\begin{pmatrix}5 & 2 & 1 & 12\\ 2 & 1 & 3 & 1\\ 1 & 2 & 3 & 1\\ -5 & 1 & 3 & 0\end{pmatrix}$$

2A+2B=? A^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases}x_1-x_2+3x_3=3\\ 2x_1+3x_2-4x_3=-1\\ 3x_1+2x_2-x_3=2\end{cases}$$

Variant 11

1) Ifodani soddalashtiring:

$\frac{a-3}{a+3}-\frac{a^2+27}{a^2-9}$ $\frac{1}{5-\sqrt{5}}-\frac{1}{5+\sqrt{5}}$

2) Ko‘paytuvchilarga ajrating:

$x^3-4x^2+x+6=0$ $x^3+9x^2+23x+15=0$

3) Sodda kasrlarga ajrating:

$\frac{x^6+x^4+x^2-1}{x^3+x^2+x+1}$

4) Tenglama va tengsizlikni eching:

$\left(\frac{1}{125}\right)^{0,2x+1} = 25$ $\left(\frac{1}{4}\right)^{x} - (2)^{1-x} - 8 < 0$;

5) Hosilani hisoblang: $y = x^2 - 3x + 2$ $y'' = ?$

6) Matristalar ustida amallarni bajaring:

$$A = \begin{pmatrix} 4 & -1 & 13 \\ -38 & 41 & -34 \\ 27 & 1 & 24 \end{pmatrix} \qquad B = \begin{pmatrix} 2 & 5 & 13 \\ 6 & 3 & 4 \\ 1 & -2 & -3 \end{pmatrix}$$

3A-B=? B^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} x_1 + 2x_2 + 3x_3 = 0 \\ 2x_1 - 3x_2 - x_3 = 1 \\ 3x_1 + x_2 + 4x_3 = -1 \end{cases}$$

Variant 12

1) Ifodani soddalashtiring: $\frac{3-\sqrt{2}}{3+\sqrt{2}} + \frac{3+\sqrt{2}}{3-\sqrt{2}}$ $\frac{3-a}{ab-a^2} - \frac{3-b}{b^2-a^2}$

2) Ko‘paytuvchilarga ajrating:

$(x-1)^3 + (2x+3)^3 = 27x^3 + 8$ $2x^4 - 21x^3 + 74x^2 - 105x + 50 = 0$

3) Sodda kasrlarga ajrating:

$\frac{x^3+x^2-4x-4}{x^3-3x+2}$

4) Tenglama va tengsizlikni eching:

$\sqrt{x^2 - 6} = \sqrt{-5x}$. $\frac{x^2+2x-3}{(x-7)(x+5)} < 0$.

5) Hosilani hisoblang: $y = (\sin x)^4 + (\cos x)^4$ $y^n = ?$

6) Matristalar ustida amallarni bajaring:

$$A = \begin{pmatrix} 1 & 7 & 3 & 14 \\ 2 & 4 & 6 & 8 \\ 3 & -1 & 9 & 12 \end{pmatrix} \qquad B = \begin{pmatrix} -5 & 1 & 3 & 14 \\ -6 & 4 & 7 & 2 \\ 1 & 0 & -7 & 2 \end{pmatrix}$$

A+3B=? A^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} x_1 - 3x_2 + 2x_3 + x_4 = 2 \\ 2x_1 + x_2 + 4x_3 + 3x_4 = 1 \\ x_1 + 5x_2 - x_3 + x_4 = -4 \\ 3x_1 - x_2 + 6x_3 + 5x_4 = 0 \end{cases}$$

Variant 13

1) Ifodani soddalashtiring: $\sqrt{18} + 3\sqrt{18} + 3\sqrt{32} - \sqrt{50}$ $\frac{a^2+12}{a^2-4} - \frac{a+3}{a-2}$

2) Ko‘paytuvchilarga ajrating:

$x^4 + 5x^3 + 4x^2 - 24x - 24 = 0$ $x^5 - 4x^4 + 4x^3 - x^2 + 4x - 4 = 0$

3) Sodda kasrlarga ajratiтg: $\frac{x^4-2x^3+x-2}{x^3-3x^2+3x-2}$

4) Tenglama va tengsizlikni eching:

$\log_7(2x + 5) = 2$; $\log_3(1 - x) > \log_3(3 - 2x)$;

5) Hosilani hisoblang: $y = x \ln x$ $y^n = ?$

6) Matristalar ustida amallarni bajaring:

$$A=\begin{pmatrix}1 & 2 & 15\\ -1 & 0 & -3\\ 4 & 3 & -2\end{pmatrix} \qquad B=\begin{pmatrix}-11 & -7 & 15\\ 14 & 6 & -2\\ 2 & -5 & -1\end{pmatrix}$$

2A+3B=? B^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases}2x_1 + x_2 + 3x_3 - 4x_4 = 3\\ x_1 - 2x_2 + x_3 - 3x_4 = -1\\ 3x_1 + 4x_2 - 5x_3 + x_4 = 4\\ 2x_1 - 4x_2 + 2x_3 - 6x_4 = 5\end{cases}$$

Variant 14

1) Ifodani soddalashtirin: $3\sqrt{20} - \sqrt{45} + 3\sqrt{18} + \sqrt{72} - \sqrt{80}$ $\frac{4}{a-b} + \frac{9}{a+b} - \frac{8a}{a^2-b^2}$

2) Ko‘paytuvchilarga ajrating:

$x^5 + 4x^4 - 6x^3 - 24x^2 - 27x - 108 = 0$ $(x+1)(x^2+2) + (x+2)(x^2+1) = 2$

3) Sodda kasrlarga ajrating: $\frac{x^4-2x^3+2x^2-2x+1}{x^3-4x^2+5x-2}$

4) Tenglama va tengsizlikni eching: $\sqrt{7-x^2} = \sqrt{-6x}$. $\frac{(x+1)(x+3)^2}{x+4} \le 0.$

5) Hosilani hisoblang: $y = \frac{1}{x^2-3x+2}$ y^n =?

6) Matristalar ustida amallarni bajaring:

$$A=\begin{pmatrix}2 & 1 & 16\\ 1 & 14 & 1\\ 2 & 3 & 2\end{pmatrix} \qquad B=\begin{pmatrix}2 & 5 & 16\\ 6 & 3 & 4\\ 5 & 4 & -3\end{pmatrix}$$

4A-3B=? A^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases}3x_1 - 2x_2 - 5x_3 + x_4 = 3\\ 2x_1 - 3x_2 + x_3 + 5x_4 = -3\\ x_1 + 2x_2 - x_3 - 4x_4 = -1\\ x_1 - x_2 - 4x_3 + 9x_4 = 22\end{cases}$$

Variant 15

1) Ifodani soddalashtiring: $3\sqrt{45} - \sqrt{125} + \sqrt{80}$ $\frac{4}{a-b} + \frac{9}{a+b} - \frac{8a}{a^2-b^2}$

2) Ko‘paytuvchilarga ajrating:

$2x^4 - x^3 + 5x^2 - x + 3 = 0$ $2x^4 - 4x^3 + 13x^2 - 6x + 15 = 0$

3) Sodda kasrlarga ajrating: $\frac{x^3+5x^2+7x+3}{2x^3+5x^2+4x+1}$

4) Tenglama va tengsizlikni eching:

$\left(\frac{1}{32}\right)^{0,1x-1} = 16$; $\left(\frac{1}{2}\right)^x + \left(\frac{1}{2}\right)^{x-2} > 5;$

5) Hosilani hisoblang: $y = \log_a x$ y^n =?

6) Matristalar ustida amallarni bajaring:

$A=\begin{pmatrix}1 & 0 & 17\\ 3 & 1 & 0\\ -1 & 2 & 4\end{pmatrix}$ $B=\begin{pmatrix}1 & 2 & 17\\ 3 & 8 & -4\\ 2 & -1 & 0\end{pmatrix}$ A-3B=? B^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases}x_1+x_2+x_3+x_4+x_5=15\\ x_1+2x_2+3x_3+4x_4+5x_5=35\\ x_1+3x_2+6x_3+10x_4+15x_5=70\\ x_1+4x_2+10x_3+20x_4+35x_5=126\\ x_1+5x_2+15x_3+35x_4+70x_5=210\end{cases}$$

Variant 16

1) Ifodani soddalashtiring: $\left(2\sqrt{\frac{2}{3}}-8\sqrt{\frac{3}{8}}+3\sqrt{\frac{3}{2}}\right)*3\sqrt{\frac{3}{2}}$ $\left(\frac{a}{b}+\frac{b}{a}-2\right)ab$

2) Ko‘paytuvchilarga ajrating:

$(x^2-5x+7)^2-(x-2)(x-3)=1$ $(x^2-2x-5)^2-2(x^2-2x-3)-4=0$

3) Sodda kasrlarga ajrating: $\frac{x^4-16}{x^4-4x^3+8x^2-16x+16}$

4) Tenglama va tengsizlikni eching:

$\sqrt{3-2x}$ = 6 + x. $\frac{(x+1)(x+3)^2}{x+4}\le 0.$

5) Hosilani hisoblang: $y=\frac{x}{x^2-1}$ $y^n=?$

6) Matristalar ustida amallarni bajaring:

$A=\begin{pmatrix}7 & -1 & 18\\ 9 & -4 & 2\\ -11 & 2 & -13\end{pmatrix}$ $B=\begin{pmatrix}31 & 17 & 18\\ 1 & 2 & 3\\ 12 & 1 & 2\end{pmatrix}$

3A+B=? A^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases}2x_1-x_2+x_3-x_4=5\\ x_1+2x_2-2x_3+3x_4=-6\\ 3x_1+x_2-x_3+2x_4=-1\end{cases}$$

Variant 17

1) Ifodani soddalashtiring: $3\sqrt{20}+\sqrt{28}+\sqrt{45}-\sqrt{63}$ $\frac{a^2}{a+1}-a+1$

2) Ko‘paytuvchilarga ajrating:

$x(x-1)(x-2)(x-3)=15$ $2x^4-21x^3+74x^2-105x+50=0$

3) Sodda kasrlarga ajrating: $\frac{4a^2-12ab+9b^2}{2a^2-ab-3b^2}$

4) Tenglama va tengsizlikni eching:

$\sqrt{3-2x}$ = 6 + x. $\left(\frac{1}{5}\right)^{x-1}+\left(\frac{1}{5}\right)^{x+1}\le 26$

5) Hosilani hisoblang: $y=\ln(ax+b)$ $y^n=?$

6) Matristalar ustida amallarni bajaring:

$A=\begin{pmatrix}2 & 3 & 19\\ 5 & 1 & 4\\ 1 & -2 & -1\end{pmatrix}$ $B=\begin{pmatrix}7 & -1 & 19\\ 9 & -4 & 2\\ -11 & 7 & -13\end{pmatrix}$

2A+B=? B^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} x_1 - 2x_2 - 5x_3 = 1 \\ 4x_1 + x_2 - 2x_3 = -3 \\ -x_1 + 3x_2 + 7x_3 = 2 \end{cases}$$

Variant 18

1) Ifodani soddalashtiring: $\frac{6}{\sqrt{2}-\sqrt{3}} - \frac{4}{\sqrt{2}+\sqrt{3}}$ $a + b - \frac{a^2}{a-1}$

2) Ko‘paytuvchilarga ajrating: $2abc^2 - 3ab^2c + 4a^2bc - 15am^3n^4 - 10am^4n^6$

3) Sodda kasrlarga ajrating: $\frac{a+a\sqrt{a}}{\sqrt[3]{a^2}+a+\sqrt[6]{a^5}} + \frac{\sqrt[3]{a^2}-a}{\sqrt[3]{a}+\sqrt{a}} - 2\sqrt[3]{a}$

4) Tenglama va tengsizlikni eching:

2sin x - 1 = 0. $\left(\frac{1}{4}\right)^x - (2)^{1-x} - 8 < 0$;

5) Hosilani hisoblang: $y = \frac{1}{ax+b}$ y^n =?

6) Matristalar ustida amallarni bajaring:

$$A = \begin{pmatrix} -3 & 1 & 20 \\ 0 & 2 & 1 \\ 0 & -1 & 3 \end{pmatrix} \qquad B = \begin{pmatrix} 2 & -4 & 20 \\ 1 & 2 & 1 \\ 5 & 1 & 2 \end{pmatrix}$$

A-2B=? B^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} -x_1 + 2x_2 - x_3 = 4 \\ 3x_1 + x_2 - 2x_3 = 1 \\ 4x_1 - x_2 + x_3 = -3 \end{cases}$$

Variant 19

1) Ifodani soddalashtiring: $\frac{1}{2}\sqrt{128} + 3\sqrt{2} + 2\sqrt{72}$ $\left(\frac{xy}{x^2-y^2} - \frac{y}{2x-2y}\right) : \frac{3y}{x^2-y^2}$

2) Ko‘paytuvchilarga ajrating: $12a^2xy^3 - 6axy^5 - 28b^4c^5y + 16b^5c^6y^8$

3) Sodda kasrlarga ajrating: $\frac{\left(30-15a^{\frac{1}{4}}\right)\left(2a^{\frac{1}{4}}+a^{\frac{1}{2}}\right)}{8a^{\frac{1}{4}}-2a^{\frac{3}{4}}}$

4) Tenglama va tengsizlikni eching: *2sin x + 1 = 0.* $\frac{x^2+2x-3}{(x-7)(x+5)} < 0.$

5) Hosilani hisoblang: $y = xe^x$ y^n =?

6) Matristalar ustida amallarni bajaring:

$$A = \begin{pmatrix} 1 & 0 & 3 & 21 \\ -5 & 4 & 6 & 8 \\ 3 & 6 & 9 & 12 \end{pmatrix} \quad B = \begin{pmatrix} 1 & 2 & 1 & 21 \\ -9 & 1 & 3 & 1 \\ 1 & 2 & -5 & 1 \\ 0 & 1 & 3 & 0 \end{pmatrix}$$

A-B=? B^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} x_1 + 2x_2 + x_3 = 8 \\ x_2 + 3x_3 + x_4 = 15 \\ 4x_1 + x_3 + x_4 = 11 \\ x_1 + x_2 + 5x_4 = 23 \end{cases}$$

Variant 20

1) Ifodani soddalashtiring: $\frac{\sqrt{3+2\sqrt{2}}+\sqrt{3-2\sqrt{2}}}{4\sqrt{2}}$ $\frac{b^2}{a^2-2ab}:\left(\frac{2ab}{a^2-4b^2}-\frac{b}{a+2b}\right)$

2) Ko‘paytuvchilarga ajrating: $x^3 - 3y^2 + 3x^2 - xy^2 - abc - 5ac - 4ab - 20ab$

3) Sodda kasrlarga ajrating: $\frac{5x+6}{x^2-4}-\frac{x}{x^2-4}:\frac{x}{x-2}-\frac{6-x}{x-2}$

4) Tenglama va tengsizlikni eching: $\sqrt{x^2-6} = \sqrt{-5x}$. $\left(\frac{1}{2}\right)^x + \left(\frac{1}{2}\right)^{x-2} > 5;$

5) Hosilani hisoblang: $y = \sin ax + \cos bx$ $y^n = ?$

6) Matristalar ustida amallarni bajaring:

$$A = \begin{pmatrix} 1 & 0 & 3 & 22 \\ -7 & 4 & 6 & 8 \\ 3 & 6 & 9 & 12 \end{pmatrix} \qquad B = \begin{pmatrix} 1 & 2 & 3 & 22 \\ 5 & 3 & 1 & 6 \\ 3 & 1 & 2 & 6 \end{pmatrix}$$

3A-3B=? A^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} -x_1 + x_2 + x_3 - x_4 = -2 \\ x_1 + 2x_2 - 2x_3 - x_4 = -5 \\ 2x_1 - x_2 - 3x_3 + 2x_4 = -1 \\ x_1 + 2x_2 + 3x_3 - 6x_4 = -10 \end{cases}$$

Variant 21

1) Ifodani soddalashtiring: $\sqrt{13 + 30\sqrt{1 + \sqrt{2} + \sqrt{6 + 4\sqrt{2}}}}$ $\left(\frac{2a+1}{2a-1}-\frac{2a-1}{2a+1}\right) * \frac{10a-5}{4a}$

2) Ko‘paytuvchilarga ajrating: $bx^2 + 2b^2 - b^3 - 2x^2$ $x^4 - (1 + ab)x^2 + ab$

3) Sodda kasrlarga ajrating: $\frac{4x(x-1)+1}{4-x^2}:\frac{1-2x}{x-2}$

4) Tenglama va tengsizlikni eching: $\sqrt{x + \sqrt{x+11}} + \sqrt{x - \sqrt{x+11}} = 4$

$\log_x \frac{x+3}{x-1} > 1$

5) Hosilani hisoblang: $y = e^{-x}$ $y^n = ?$

6) Matristalar ustida amallarni bajaring:

$$A = \begin{pmatrix} 1 & 4 & 23 \\ 3 & 1 & 0 \\ -1 & 2 & 4 \end{pmatrix} \qquad B = \begin{pmatrix} 2 & -1 & 23 \\ 5 & 3 & 2 \\ 1 & 4 & 3 \end{pmatrix}$$

2A+2B=? B^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} 4x_1 - 3x_2 + x_3 + 5x_4 - 7 = 0 \\ x_1 - 2x_2 - 2x_3 - 3x_4 - 3 = 0 \\ 3x_1 - x_2 + 2x_3 + 3x_4 - 2 = 0 \\ 2x_1 + 3x_2 + 2x_3 - 8x_4 + 7 = 0 \end{cases}$$

Variant 22

1) Ifodani soddalashtiring: $\left(\frac{2a+1}{2a-1}-\frac{2a-1}{2a+1}\right)*\frac{10a-5}{4a}$ $\frac{b+5}{b+2}-\frac{3}{b^2-4}-\frac{b+1}{b-2}$

2) Ko‘paytuvchilarga ajrating: $x^4-(a+b)x^2+ab;\ \ x^4+x^3-2x^2+4x-24$

3) Sodda kasrlarga ajrating: $\frac{x^2+4(x-1)}{x-1}:\frac{2-x}{1-x^2}$

4) Tenglama va tengsizlikni eching: $\sqrt[3]{24+\sqrt{x}}-\sqrt[3]{5+\sqrt{x}}=1$ $\log_{x^2-3}729>3$

5) Hosilani hisoblang: $y=e^{ax}$ $y^n=?$

6) Matristalar ustida amallarni bajaring:

$$A=\begin{pmatrix}10 & 2 & 3 & 24\\ 2 & 3 & 4 & 5\\ 1 & 5 & 5 & 7\\ 2 & 4 & 7 & 8\end{pmatrix} \qquad B=\begin{pmatrix}7 & -2 & 3 & 24\\ 11 & 7 & 3 & 4\\ 5 & 4 & 3 & 0\\ 22 & 2 & 9 & 8\end{pmatrix}$$

A+2B=? A^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} x_1+2x_2+3x_3+4x_4+5x_5=2\\ 2x_1+3x_2+7x_3+10x_4+13x_5=12\\ 3x_1+5x_2+11x_3+16x_4+21x_5=17\\ 2x_1-7x_2+7x_3+7x_4+2x_5=57\\ x_1+4x_2+5x_3+3x_4+10x_5=7 \end{cases}$$

Variant 23

1) Ifodani soddalashtiring: $\frac{\sqrt{5}}{\sqrt{5}-2}-\frac{10}{\sqrt{5}}$ $\frac{5x+6}{x^2-4}-\frac{x}{x^2-4}:\frac{x}{x-2}-\frac{x+2}{x-2}$

2) Ko‘paytuvchilarga ajrating: $x^4-3x^3+x^2+3x-2;$ $x^3-7x^2+16x-12$

3) Sodda kasrlarga ajrating: $\frac{x^4-10x^2+9}{x^4-13x^2+36}$

4) Tenglama va tengsizlikni eching: $\frac{x+n}{m+n}-\frac{m-n}{x-n}=\frac{x+p}{m+p}-\frac{m-p}{x-p}$ $5^{\log_x\frac{8-12x}{x-6}}>25$

5) Hosilani hisoblang: $y=\frac{1-x}{1+x}$ $y^n=?$

6) Matristalar ustida amallarni bajaring:

$$A=\begin{pmatrix}5 & 2 & -2 & 25\\ 6 & 4 & -3 & 5\\ 9 & 2 & -3 & 4\\ 7 & 6 & -4 & 7\end{pmatrix} \qquad B=\begin{pmatrix}7 & -2 & 3 & 25\\ 11 & 0 & 3 & 4\\ 5 & 41 & 3 & 5\\ 22 & 2 & 9 & 8\end{pmatrix}$$

3A-B=? A^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} x_1-3x_2+2x_3+x_4=2\\ 2x_1+x_2+4x_3+3x_4=1\\ x_1+5x_2-x_3+x_4=-4\\ 3x_1-x_2+6x_3+5x_4=0 \end{cases}$$

Variant 24

1) Ifodani soddalashtiring:

$$\frac{19}{\sqrt{20}-1}-2\sqrt{5}+3 \qquad \frac{3-a}{ab-a^2}-\frac{3-b}{b^2-a^2}$$

2) Ko‘paytuvchilarga ajrating:

$x^3 - 4x^2 + x + 6$ $x^3 - 2x^2 - 4x + 8$

3) Sodda kasrlarga ajrating:

$$\frac{x^4 - 17x^2 + 16}{x^4 - 50x^2 + 49}$$

4) Tenglama va tengsizlikni eching:

$\log_{x+6}(2x - \sqrt{x+6}) = \frac{1}{2}$ $3^{\log_2 \frac{3-x}{x}} < 1$

5) Hosilani hisoblang: $y = x^3 \ln x$ $y'''' = ?$

6) Matristalar ustida amallarni bajaring:

$$A = \begin{pmatrix} 7 & -2 & 3 & 26 \\ 11 & -5 & 3 & 4 \\ 5 & 4 & 3 & 0 \\ 22 & 2 & 9 & 8 \end{pmatrix} \qquad B = \begin{pmatrix} 5 & 2 & -2 & 26 \\ 6 & 4 & -3 & 5 \\ 9 & 2 & 0 & 4 \\ 7 & 6 & -4 & 7 \end{pmatrix}$$

A-B=? B^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} x_1 + x_2 + x_3 = 3 \\ x_1 - x_2 + x_3 = 1 \\ 2x_1 + x_2 - x_3 = 2 \end{cases}$$

Variant 25

1) Ifodani soddalashtiring: $\sqrt{13 + 30\sqrt{1 + \sqrt{2} + \sqrt{6 + 4\sqrt{2}}}}$; $\frac{3-a}{ab-a^2} - \frac{3-b}{b^2-a^2}$

2) Ko‘paytuvchilarga ajrating: $2a^5b - 4a^4b + 2a^3b$ $a^2 - 2ab + b^2 - y^2$

3) Sodda kasrlarga ajrating: $\sqrt{\frac{a^{\frac{3}{2}} - b^{\frac{3}{2}}}{a^{\frac{1}{2}} - b^{\frac{1}{2}}} + a^{\frac{1}{2}}b^{\frac{1}{2}}} - \sqrt{\frac{a^{\frac{3}{2}} + b^{\frac{3}{2}}}{a^{\frac{1}{2}} + b^{\frac{1}{2}}} - a^{\frac{1}{2}}b^{\frac{1}{2}}}$

4) Tenglama va tengsizlikni eching: $\log_{0,4}(6 - x) = -1$ $\log_{x^2-3} 729 > 3$

5) Hosilani hisoblang: $y = \frac{a}{x^n}$ $y''(x) = ?$

6) Matristalar ustida amallarni bajaring:

$$A = \begin{pmatrix} 7 & 8 & 6 & 27 \\ 5 & 7 & 4 & 5 \\ 3 & 4 & 5 & 6 \\ 2 & 0 & 1 & 2 \end{pmatrix} \qquad B = \begin{pmatrix} 1 & 8 & 6 & 27 \\ 5 & 0 & 4 & 5 \\ 3 & 4 & 4 & 6 \\ 7 & -5 & 1 & 2 \end{pmatrix}$$

A+B=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} 2x - 5y + 3z + t = 5 \\ 3x - 7y + 3z - t = -1 \\ 5x - 9y + 6z + 2t = 7 \\ 4x - 6y + 3z + t = 8 \end{cases}$$

Variant 26

1) Ifodani soddalashtiring: $\frac{b+5}{b+2}-\frac{3}{b^2-4}-\frac{b+1}{b-2}$ $\frac{1}{5-\sqrt{5}}-\frac{1}{5+\sqrt{5}}$

2) Ko‘paytuvchilarga ajrating: $6m^4n+12m^3n+3m^2n$; $a^4+2a^2b^2+b^4-4a^2b^2$

3) Sodda kasrlarga ajrating: $\left(\frac{1}{\sqrt{a}+\sqrt{a+1}}+\frac{1}{\sqrt{a}-\sqrt{a-1}}\right)(\sqrt{a+1}-\sqrt{a-1})$

4) Tenglama va tengsizlikni eching: $\frac{1}{x-\sqrt{x^2-x}}-\frac{1}{x+\sqrt{x^2-x}}=\sqrt{3}$; $\frac{m^2x+1}{2}-\frac{m^2x+3}{3}<\frac{m+9x}{6}$

5) Hosilani hisoblang: $y=x^6-4x^3+4$ $y''''(1)=?$

6) Matristalar ustida amallarni bajaring:

$$A=\begin{pmatrix}5 & 8 & 28\\ 6 & 9 & -5\\ 4 & 7 & -3\end{pmatrix} \qquad B=\begin{pmatrix}3 & 2 & 28\\ 4 & -1 & 3\\ 9 & 6 & 5\end{pmatrix}$$

A-2B=? B^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases}2x_1-x_2+x_3-x_4=5\\ x_1+2x_2-2x_3+3x_4=-6\\ 3x_1+x_2-x_3+2x_4=-1\end{cases}$$

Variant 27

1) Ifodani soddalashtiring: $2\sqrt{18}+3\sqrt{18}+3\sqrt{32}-\sqrt{50}$ $\frac{5x+6}{x^2-4}-\frac{x}{x^2-4}:\frac{x}{x-2}-\frac{x+2}{x-2}$

2) Ko‘paytuvchilarga ajrating: $x^3-y^3-5x(x^2+xy+y^2)$; $(a+8)^2-2(a+8)(a-2)+(a-2)^2$

3) Sodda kasrlarga ajrating: $\left(\frac{2}{1-x^2}-\frac{2}{(x-1)^2}\right)*(1-x)^2-\frac{4}{1+x}$

4) Tenglama va tengsizlikni eching:

$x^4-3x^3+x^2+3x-2=0$ $|2x^2-9x+15|>19$

5) Hosilani hisoblang: $y=(x^2+1)^3$ $y''=?$

6) Matristalar ustida amallarni bajaring:

$$A=\begin{pmatrix}-10 & -9 & 29\\ 1 & 5 & 8\\ -1 & -3 & 6\end{pmatrix} \qquad B=\begin{pmatrix}3 & 2 & 29\\ 4 & 5 & 3\\ 9 & 6 & 5\end{pmatrix}$$

3A-B=? B^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases}x_1+x_2+x_3=2\\ 3x_1+2x_2+2x_3=1\\ 4x_1+3x_2+3x_3=4\end{cases}$$

Variant 28

1) Ifodani soddalashtiring: $3\sqrt{20}-\sqrt{45}+3\sqrt{18}+\sqrt{72}-\sqrt{80}$; $\frac{a^2+12}{a^2-4}-\frac{a+3}{a-2}$

2) Ko‘paytuvchilarga ajrating: $4(m^3-3)^2-(m^2-6)(m^2+6)-9(8-m+m^2)(1-m)$

3) Sodda kasrlarga ajrating: $\frac{y\sqrt[4]{\pi}+x\sqrt[4]{\pi}}{y^2\sqrt{\pi}-x^2\sqrt{\pi}}$; $\left(\frac{1+x+\sqrt{x}}{x\sqrt{x}-1}\right)^{-1}-x^{\frac{1}{2}}$

4) Tenglama va tengsizlikni eching: $\log_4(x-2)+\log_{\frac{1}{2}}(x-2)=\frac{1}{2}$; $\left(\frac{1}{2}\right)^x+\left(\frac{1}{2}\right)^{x-2}>5$;

5) Hosilani hisoblang: $y=(x+10)^6$ $y'''(2)=?$

6) Matristalar ustida amallarni bajaring:

$A=\begin{pmatrix} 7 & -2 & 3 & 30 \\ 11 & -5 & 3 & 4 \\ 5 & 4 & 3 & 0 \\ 22 & 0 & 9 & 8 \end{pmatrix}$ $B=\begin{pmatrix} 5 & 2 & -2 & 30 \\ 6 & 4 & 0 & 5 \\ 9 & 4 & -3 & 4 \\ 7 & 6 & -4 & 7 \end{pmatrix}$ A+3B=? A^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} x_1 + x_2 - 6x_3 - 4x_4 = 6 \\ 3x_1 - x_2 - 6x_3 - 4x_4 = 2 \\ 2x_1 + 3x_2 + 9x_3 + 2x_4 = 6 \\ 3x_1 + 2x_2 + 3x_3 + 8x_4 = -7 \end{cases}$$

Variant 29

1) Ifodani soddalashtiring: $\frac{20(a+2b)}{a-2b}$ $\frac{20a^2-80b^2}{a^2-4ab+4b^2}$

2) Ko‘paytuvchilarga ajrating: $x^4-3x^3+x^2+3x-2;$ $x^3-y^3-5x(x^2+xy+y^2)$

3) Sodda kasrlarga ajrating: $\frac{x+2}{1-x}-\frac{1-x^2}{1+x^2}*\left(\frac{1}{(x-1)^2}-\frac{x^2}{1-x^2}\right)$

4) Tenglama va tengsizlikni eching: $\log_4(x-2)+\log_{\frac{1}{2}}(x-2)=\frac{1}{2}$; $\log_3(1-x)>\log_3(3-2x)$;

5) Hosilani hisoblang: $y=\ln\left(x+\sqrt{1+x^2}\right)$ $y'''(2)=?$

6) Matristalar ustida amallarni bajaring:

$A=\begin{pmatrix} 2 & -4 & 3 & 1 & 1 \\ 1 & -2 & 1 & -4 & 2 \\ 0 & 1 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{pmatrix}$ $B=\begin{pmatrix} 32 & -4 & 3 & -91 & 1 \\ 1 & 2 & 1 & -4 & 2 \\ 0 & 17 & -1 & 3 & 1 \\ 4 & -7 & 4 & -4 & 5 \end{pmatrix}$ A+2B=? B^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} x_1 + x_2 - 6x_3 - 4x_4 = 6 \\ 3x_1 - x_2 - 6x_3 - 4x_4 = 2 \\ 2x_1 + 3x_2 + 9x_3 + 2x_4 = 6 \\ 3x_1 + 2x_2 + 3x_3 + 8x_4 = -7 \end{cases}$$

Variant 30

1) Ifodani soddalashtiring:

$\frac{xy^{\frac{1}{2}}-x^{\frac{1}{2}}}{x^{\frac{1}{2}}y-y^{\frac{1}{2}}}$ $\frac{a^2-2ab+b^2-49}{a-b-7}$

2) Ko‘paytuvchilarga ajrating: $m^2x^4-mnx^3+2mx^2-2nx-n+mx$ $(a+8)^2-2(a+8)(a-2)+(a-2)^2$

3) Sodda kasrlarga ajrating: $\frac{25x^4-a^2x^2-25b^2x^2+a^2b^2}{4x^4-a^2x^2-4b^2x^2+a^2b^2}$

4) Tenglama va tengsizlikni eching: $\sqrt{x^2-6}=\sqrt{-5x}$. $\frac{x^2+2x-3}{(x-7)(x+5)}<0.$

5) Hosilani hisoblang: $y=e^{1-2x}\cdot\sin(2+3x),$ $y^{IV}=?$

6) Matristalar ustida amallarni bajaring:

$A=\begin{pmatrix} 0 & 2 & 2 \\ -1 & -4 & 5 \\ 3 & 1 & 7 \\ 0 & 5 & -10 \\ 2 & 3 & 0 \end{pmatrix}$ $B=\begin{pmatrix} 24 & 2 & 2 \\ -1 & -4 & -4 \\ 8 & 1 & 7 \\ 0 & 5 & -10 \\ 2 & 3 & 21 \end{pmatrix}$ 2A-B=? B^T=?

7) Tenglamalar sistemasini teskari matrista usulida eching:

$$\begin{cases} 2x + y + 4z + 8t = -1 \\ x + 3y - 6z + 2t = 3 \\ 3x - 2y + 2z - 2t = 8 \\ 2x + y - 2z = 4 \end{cases}$$

Amaliyot ishi №7. Mathcadda va elektron jadvallarda tenglamalar yechish.

Variant 1

1. Berilgan tenglamalarni yeching:

$10\sin x - x^2 = 0$ $\quad \frac{6}{x^2-1} - \frac{2}{x-1} = 2 - \frac{x+4}{x-1}$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} \sin(x+1) - y = 1{,}2 \\ 2x + \cos y = 2 \end{cases} \qquad \begin{cases} x_1 + 2x_2 + 3x_3 + 4x_4 + 5x_5 = 2 \\ 2x_1 + 3x_2 + 7x_3 + 10x_4 + 13x_5 = 12 \\ 3x_1 + 5x_2 + 11x_3 + 16x_4 + 21x_5 = 17 \\ 2x_1 - 7x_2 + 7x_3 + 7x_4 + 2x_5 = 57 \\ x_1 + 4x_2 + 5x_3 + 3x_4 + 10x_5 = 7 \end{cases}$$

3. Berilgan tengsizliklarni yeching: $\frac{3x}{2} - \frac{3}{5} > 4x + 3 \quad 3(x-2) + x < 4x + 1$

4. Berilgan tengsizliklar sistemasini yeching: $\begin{cases} \sqrt{4x-7} < x \\ \sqrt{x+5} + \sqrt{5-x} > 4 \end{cases}$

Variant 2

1. Berilgan tenglamalarni yeching:

$x^3 - 2x + 2 = 0$ $\quad \sqrt{3x-2} = 2\sqrt{x+2} - 2$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} \sin x + 2y = 2 \\ \cos(y-1) + x = 0{,}7 \end{cases} \qquad \begin{cases} x_1 + x_2 - x_3 = 4 \\ 2x_1 + 4x_2 + x_3 = 9 \\ x_1 - x_2 + x_3 = -2 \\ 2x_1 + 5x_2 - 3x_3 = 15 \end{cases}$$

3. Berilgan tengsizliklarni yeching: $5(x+2) - x > 3(x-1) + x; \frac{3x+6}{4} - \frac{x}{4} > \frac{x+2}{2}$

4. Berilgan tengsizliklar sistemasini yeching: $\begin{cases} \sqrt{x^2 + 9x + 20} \le \sqrt{x-1} \\ \sqrt{x-1} \le \sqrt{x^2 - 13} \end{cases}$

Variant 3

1. Berilgan tenglamalarni yeching: $2^x - 3\cos x + 1 = 0 \quad 3\left(x + \frac{1}{x^2}\right) - 7\left(1 + \frac{1}{x}\right) = 0$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} tg(xy+0{,}4)=x^2 \\ 0{,}6x^2+2y^2=1 \end{cases} \qquad \cdot \begin{cases} 4x_1-3x_2+x_3+5x_4-7=0 \\ x_1-2x_2-2x_3-3x_4-3=0 \\ 3x_1-x_2+2x_3+3x_4-2=0 \\ 2x_1+3x_2+2x_3-8x_4+7=0 \end{cases}$$

3. Berilgan tengsizliklarni yeching: $5x+1>2(x-1)+3x+3;\ \ 5(x+2)+2(x-3)<3(x-1)+4x$

4. Berilgan tengsizliklar sistemasini yeching: $\begin{cases} \sqrt{3x+2}-3>1 \\ \sqrt{4x^2-4x+1+5}\geq 1 \end{cases}$

Variant 4

1.Berilgan tenglamalarni yeching:

$x^4-x^3-2x+1=0$ $\qquad \dfrac{(3+x)(2+x)(1+x)}{(3-x)(2-x)(1-x)}=0$

2.Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} \cos(x+0{,}5)+y=0{,}8 \\ \sin y-2x=1{,}6 \end{cases} \qquad \begin{cases} -x_1+x_2+x_3-x_4=-2 \\ x_1+2x_2-2x_3-x_4=-5 \\ 2x_1-x_2-3x_3+2x_4=-1 \\ x_1+2x_2+3x_3-6x_4=-10 \end{cases}$$

3.Berilgan tengsizliklarni yeching: $3(2x-1)+3(x-1)>5(x+2)+2(2x--3);\quad 3(x-5)+9>15$

4.Berilgan tengsizliklar sistemasini yeching: $\begin{cases} 9-2x-x^2<1 \\ 2x-3<1 \end{cases}$

Variant 5

1.Berilgan tenglamalarni yeching:

$\text{Cos}(2x+1)-3\text{Sin}x=0$ $\qquad \dfrac{x-2}{x-1}+\dfrac{x+2}{x+1}=\dfrac{x-4}{x-3}+\dfrac{x+4}{x+3}-\dfrac{28}{15}$

2.Berilgan tenglamalar sistemasini yeching:

$$\cdot \quad \begin{cases} \cos x+y=1{,}5 \\ 2x-\sin(y-0{,}5)=1 \end{cases} \qquad \begin{cases} x_1+2x_2+x_3=8 \\ x_2+3x_3+x_4=15 \\ 4x_1+x_3+x_4=11 \\ x_1+x_2+5x_4=23 \end{cases}$$

3.Berilgan tengsizliklarni yeching: $3(\text{y}+4)\geq 4-(1-3\text{y})\ ;\ (\text{x}-1)^2+7>\text{x}+4^2$

4. Berilgan tengsizliklar sistemasini yeching: $\begin{cases} \frac{1}{x}<1 \\ \frac{3x-1}{x-2}>2 \\ |3-2x|\leq 3 \end{cases}$

Variant 6

1. Berilgan tenglamalarni yeching:

x^3-Cos(x+0,5)+1=0 $\dfrac{x^2+1}{x}+\dfrac{x}{x^2+1}=2{,}9$

2. Berilgan tenglamalar sistemasini yeching:

$\begin{cases}\sin(x+0{,}5)-y=1\\ 2x-\sin(y-0{,}5)=1\end{cases}$. $\begin{cases}x_1-x_2-3x_3=6\\ -2x_1+2x_2+6x_3=-9\end{cases}$

3. Berilgan tengsizliklarni yeching:

$5(0.2+y)-1.8\geq 4.3+5y$ $(x+3)(x-2)\geq(x+2)(x-3)$

1. Berilgan tengsizliklar sistemasini yeching:

$\begin{cases}\sqrt{5-x}>0\\ x^2-2x-3>0\end{cases}$

Variant 7

1. Berilgan tenglamalarni yeching:

arctgx+e^x+x=0 $\dfrac{x^2-x}{x^2-x+1}-\dfrac{x^2-x+2}{x^2-x-2}=1$

2. Berilgan tenglamalar sistemasini yeching:

$\begin{cases}\sin(x-1)=1{,}3-y\\ x-\sin(y+1)=0{,}8\end{cases}$ $\begin{cases}x_1-3x_2=-5\\ -x_1+x_2=1\\ 4x_1-x_2=2\end{cases}$

3. Berilgan tengsizliklarni yeching:

$(x+1)(x-4)+4\geq(x+2)(x-3)-x$ $\dfrac{2}{3x+6}<0$

4. Berilgan tengsizliklar sistemasini yeching:

$\begin{cases}\dfrac{5x-7}{x-5}<4\\ \dfrac{3x}{x^2-25}-\dfrac{x}{5-x}<0\end{cases}$

Variant 8

1. Berilgan tenglamalarni yeching:

$3x^3$arctgx-1=0 $\dfrac{3}{1+x+x^2}=3-x-x^2$

2. Berilgan tenglamalar sistemasini yeching:

$\begin{cases}2y-\cos(x+1)=0;\\ x+\sin y=-0{,}4.\end{cases}$ $\begin{cases}-x_1+2x_2-x_3=4\\ 3x_1+x_2-2x_3=1\\ 4x_1-x_2+x_3=-3\end{cases}$

3. Berilgan tengsizliklarni yeching:

$4(y-1) < 2+7y$ $\qquad$ $3(x-2)-2x < 4x+1$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} 2a-1 \geq 0 \\ 1-\sqrt{2a-1} \geq 0 \end{cases}$$

Variant 9

1. Berilgan tenglamalarni yeching:

$x-3\cos^2 1{,}04x=0$ $\qquad$ $x^3-4x^2+x+6=0$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} \cos(x+0{,}5)-y=2 \\ \sin y-2x=1 \end{cases} \qquad \cdot \begin{cases} x_1-2x_2-5x_3=1 \\ 4x_1+x_2-2x_3=-3 \\ -x_1+3x_2+7x_3=2 \end{cases}$$

3. Berilgan tengsizliklarni yeching:

$4y-9 > 3(y-2)$ $\qquad$ $6x+1 \geq 2(x-1)-3x$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} \sqrt{3-x} > \sqrt{x-2} \\ \sqrt{3x-5} > \sqrt{x-4} \end{cases}$$

Variant 10

1. Berilgan tenglamalarni yeching:

$e^x+x^2-2=0$ $\qquad$ $x^3+9x^2+23x+15=0$

2. Berilgan tenglamalar sistemasini yeching:

$$\cdot \begin{cases} \sin(x+2)-y=1{,}5 \\ x+\cos(y-2)=0{,}5 \end{cases} \qquad \begin{cases} 2x_1-x_2+x_3-x_4=5 \\ x_1+2x_2-2x_3+3x_4=-6 \\ 3x_1+x_2-x_3+2x_4=-1 \end{cases}$$

3. Berilgan tengsizliklarni yeching:

$\frac{1}{2}x(2x-4) \geq (x-2)x$ $\qquad$ $(x-3)(3+x) > (x+2)^2$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} \sqrt{3x-1}-\sqrt{5} > 0 \\ \sqrt{4-x} < \frac{1}{2} \end{cases}$$

Variant 11

1. Berilgan tenglamalarni yeching:

$x\sin x-3\cos x+1=0$ $\qquad$ $(x-1)^3+(2x+3)^3=27x^3+8$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases}\sin(y+1)-x=1{,}2\\ 2y+\cos x=2\end{cases} \qquad \begin{cases}x+2y+3z=5\\ 2x-y-z=1\\ x+3y+4z=6\end{cases}$$

3. Berilgan tengsizliklarni yeching:

$(x+1)(x-8)>(x+2)(x-4)$ $\qquad$ $(x-1)(x+2)>(x+1)(x-2)$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases}x+1\geq\sqrt[3]{x^2+1}\\ \sqrt{x-3}\geq\sqrt[4]{x-1}\end{cases}$$

Variant 12

1. Berilgan tenglamalarni yeching:

$x^3+3x-1=0$ $\qquad$ $2x^4-21x^3+74x^2-105x+50=0$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases}\cos(y-1)+x=0{,}5\\ y-\cos x=3\end{cases} \qquad \begin{cases}x_1+x_2+x_3+x_4+x_5=15\\ x_1+2x_2+3x_3+4x_4+5x_5=35\\ x_1+3x_2+6x_3+10x_4+15x_5=70\\ x_1+4x_2+10x_3+20x_4+35x_5=126\\ x_1+5x_2+15x_3+35x_4+70x_5=210\end{cases}$$

3. Berilgan tengsizliklarni yeching:

$5(x+1)-x>2x+2$ $\qquad$ $3(x+8)\geq 4(7-x)$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases}\dfrac{3x-2}{4}+2\dfrac{1}{2}>\dfrac{2x-1}{3}-\dfrac{3x+2}{6}\\ \dfrac{2x-5}{3}-\dfrac{3x-1}{2}<\dfrac{3-x}{5}-\dfrac{2x-1}{4}\end{cases}$$

Variant 13

1. Berilgan tenglamalarni yeching:

$3^{x-1}-2\sin x-4=0$ $\qquad$ $x^4+5x^3+4x^2-24x-24=0$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases}\sin y+2x=2\\ \cos(x-1)+y=0{,}7\end{cases} \qquad \begin{cases}3x_1-2x_2-5x_3+x_4=3\\ 2x_1-3x_2+x_3+5x_4=-3\\ x_1+2x_2-x_3-4x_4=-1\\ x_1-x_2-4x_3+9x_4=22\end{cases}$$

3. Berilgan tengsizliklarni yeching:

$0.5(x+3)-0.8<0.4(x+2)-0.3$ $\qquad$ $\sqrt{4x-7}<x$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} 5x-2 \geq 2x+1 \\ 2x+3 \leq 18-3x \end{cases}$$

Variant 14

1. Berilgan tenglamalarni yeching:

$x^4+x^3-2x+1=0$ $\qquad x^5-4x^4+4x^3-x^2+4x-4=0$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} \sin(x+y)=1{,}2x-0{,}1; \\ x^2+y^2=1 \end{cases} \qquad \begin{cases} 3x_1+x_2=0 \\ -x_1+2x_2=5 \\ 2x_1-4x_2=1 \end{cases}$$

3. Berilgan tengsizliklarni yeching:

$\sqrt{x+5}+\sqrt{5-x}>4$ $\qquad 5(x+1)+6(x+2)>9(x+3)$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} \dfrac{3x-2}{4} > \dfrac{1-5x}{6} \\ 3x-1 \leq 3-2x \end{cases}$$

Variant 15

1. Berilgan tenglamalarni yeching:

5Sinx-xSinx=0 $\qquad x^5+4x^4-6x^3-24x^2-27x-108=0$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} \sin(y+0{,}5)-x=1 \\ \cos(x-2)+y=0 \end{cases} \qquad \begin{cases} x_1-2x_2+x_3=4 \\ x_1+3x_2+x_3=0 \end{cases}$$

3. Berilgan tengsizliklarni yeching:

$7x-3(2x+3)>2(x-18)$ $\qquad x^2-14x+45>0$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} |x^2-4x|<5 \\ |x+1|<3 \end{cases}$$

Variant 16

1. Berilgan tenglamalarni yeching:

sin(x+p/2)-8cosx=0 $\qquad (x+1)(x^2+2)+(x+2)(x^2+1)=2$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} \cos(y+0{,}5)+x=0{,}8 \\ \sin x-2y=1{,}6 \end{cases} \qquad \begin{cases} 2x_1+x_2+3x_3-4x_4=3 \\ x_1-2x_2+x_3-3x_4=-1 \\ 3x_1+4x_2-5x_3+x_4=4 \\ 2x_1-4x_2+2x_3-6x_4=5 \end{cases}$$

3. Berilgan tengsizliklarni yeching:

$x^2 + 2x > 6x - 15$ $3x^2 - 7x + 2 < 0$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} |x^2 + 5x| < 6 \\ |x + 1| \le 1 \end{cases}$$

Variant 17

1. Berilgan tenglamalarni yeching:

arctg(e^x+1)-sinx=0 $2x^4 - x^3 + 5x^2 - x + 3 = 0$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} \sin(y-1) + x = 1{,}3 \\ y - \sin(x+1) = 0{,}8 \end{cases} \qquad \begin{cases} x_1 - 3x_2 + 2x_3 + x_4 = 2 \\ 2x_1 + x_2 + 4x_3 + 3x_4 = 1 \\ x_1 + 5x_2 - x_3 + x_4 = -4 \\ 3x_1 - x_2 + 6x_3 + 5x_4 = 0 \end{cases}$$

3. Berilgan tengsizliklarni yeching:

$3x^2 - 7x - 6 < 0$ $3x^2 - 2x + 5 > 0$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} 5x - 4 \ge x - 3 \\ -2x + 11 > x + 1 \\ 12 - 3x > 4 - 5x \end{cases}$$

Variant 18

1. Berilgan tenglamalarni yeching:

2x-arctg(x-1)=0 $2x^4 - 4x^3 + 13x^2 - 6x + 15 = 0$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} 2x - \cos(y+1) = 0; \\ y + \sin x = -0{,}4 \end{cases} \qquad \begin{cases} x_1 + 2x_2 + 3x_3 = 0 \\ 2x_1 - 3x_2 - x_3 = 1 \\ 3x_1 + x_2 + 4x_3 = -1 \end{cases}$$

3. Berilgan tengsizliklarni yeching:

$5x^2 - 7x + 2 < 0$ $x^2 - 6x + 18 > 0$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} 3x \le 5 - 6x \\ -3x + 1 \le 4x - 1 \\ 7 - 2x > 2x + 9 \end{cases}$$

Variant 19

1. Berilgan tenglamalarni yeching:

$\sqrt{x}$-cos0,387x=0 $\left(x^2-5x+7\right)^2-(x-2)(x-3)=1$

2. Berilgan tenglamalar sistemasini yeching:

$\begin{cases}\cos(y+0{,}5)-x=2\\ \sin x-2y=1\end{cases}$ $\begin{cases}x_1-x_2+3x_3=3\\ 2x_1+3x_2-4x_3=-1\\ 3x_1+2x_2-x_3=2\end{cases}$

3. Berilgan tengsizliklarni yeching:

$x^2-2x-3<0$ $4+3x-x^2>0$

4. Berilgan tengsizliklar sistemasini yeching:

$\begin{cases}3x-2>2(x-2)+5x\\ 2x^2+(5+x)^2>3(x-5)(x+5)\end{cases}$

Variant 20

1. Berilgan tenglamalarni yeching:

e^x-2(x-1)^2=0 $\left(x^2-2x-5\right)^2-2(x^2-2x-3)-4=0$

2. Berilgan tenglamalar sistemasini yeching:

$\begin{cases}\sin(y+2)-x=1{,}5\\ y+\cos(x-2)=0{,}5\end{cases}$ $\begin{cases}2x-5y+3z+t=5\\ 3x-7y+3z-t=-1\\ 5x-9y+6z+2t=7\\ 4x-6y+3z+t=8\end{cases}$

3. Berilgan tengsizliklarni yeching:

$\sin 2x\geq\frac{1}{2}$ $\cos 2x\leq\frac{1}{2}$

4. Berilgan tengsizliklar sistemasini yeching:

$\begin{cases}2\left(x-\frac{1}{2}\right)(x+3)>2x(x+3)\\ \frac{x+3}{3}>\frac{3x+4}{2}\end{cases}$

Variant 21

1. Berilgan tenglamalarni yeching:

lg(x+1)-2^x+3x=0 $x(x-1)(x-2)(x-3)=15$

2. Berilgan tenglamalar sistemasini yeching:

$\begin{cases}\sin(x-y)-xy=-1;\\ x^2-y^2=\frac{3}{4}\end{cases}$ $\begin{cases}2x-y+3z=9\\ 3x-5y+z=-4\\ 4x-7y+z=5\end{cases}$

3. Berilgan tengsizliklarni yeching:

$\tan x \geq 1$ $\tan 5x \geq 0$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} 8x(2+x)(x-2) < (2x-3)(4x^2+6x+9) - 5x \\ \left(\frac{1}{4}x+2\right)\left(2-\frac{1}{4}x\right) - \left(3-\frac{1}{4}x\right)\left(\frac{1}{4}x+2\right) > -3 \end{cases}$$

Variant 22

1. Berilgan tenglamalarni yeching:

x^3-cosx=0 $\ln x = x-2$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} tg(x-y) - xy = 0 \\ x^2 + 2y^2 = 1 \end{cases} \qquad \begin{cases} 3x_1 + 4x_2 + x_3 + 2x_4 + 3 = 0 \\ 3x_1 + 5x_2 + 3x_3 + 5x_4 + 6 = 0 \\ 6x_1 + 8x_2 + x_3 + 5x_4 + 8 = 0 \\ 3x_1 + 5x_2 + 3x_3 + 7x_4 + 8 = 0 \end{cases}$$

3. Berilgan tengsizliklarni yeching:

$x(x-8)(x-7) > 0$ $(x-1)\left(x^2 - \frac{1}{9}\right) \geq 0$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} \left(3x+\frac{1}{2}\right)(2-x) + \frac{1}{2}(x+1) > 3(3-x)(3+x) - 1 \\ 2 - (2x+3)^2 + (3+2x)(3-2x) < -2\frac{1}{3}(9+x) + \frac{1}{3} \end{cases}$$

Variant 23

1. Berilgan tenglamalarni yeching:

x^2-10xlnx=0 $x^3 + 2x^2 - 1 = 0$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} \sin(x+y) = 1{,}1x - 0{,}1; \\ x^2 + y^2 = 1 \end{cases} \qquad \begin{cases} 2x_1 + 3x_2 + 11x_3 + 5x_4 = 2 \\ x_1 + x_2 + 5x_3 + 2x_4 = 1 \\ 2x_1 + x_2 + 3x_3 + 2x_4 = -3 \\ 3x_1 + x_2 + 3x_3 + 4x_4 = -7 \end{cases}$$

3. Berilgan tengsizliklarni yeching:

$(x-1)(x+3) < 0$ $(x+3)\left(x^2 - \frac{1}{4}\right) \leq 0$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} \dfrac{1}{x} < 1 \\ \dfrac{3x-1}{x-2} > 2 \\ |3-2x| \le 3 \end{cases}$$

Variant 24

1. Berilgan tenglamalarni yeching:
   x^3-0.5x^2-x+3=0 $(x+1)(x^2-4)(x^2+x-2)=0$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} tg(xy+0{,}1) = x^2; \\ 0{,}5x^2 + 2y^2 = 1 \end{cases} \qquad \begin{cases} x_1 + x_2 - 2x_3 = -7 \\ 3x_1 - 3x_2 + x_3 = 12 \\ 5x_1 - x_2 - 4x_3 = -5 \end{cases}$$

3. Berilgan tengsizliklarni yeching:
$x^2 - 3x + 2 > 0$ $x^2 - 2x - 3 < 0$

4. Berilgan tengsizliklar sistemasini yeching:
$$\begin{cases} \frac{5x-7}{x-5} < 4 \\ \frac{3x}{x^2-25} - \frac{x}{5-x} < 0 \end{cases}$$

Variant 25

1. Berilgan tenglamalarni yeching:
   2Cosx-xSinx=0 $(x-7)(x+3) + (x-1)(x+5) = 102$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} \sin(x+y) - 1{,}4x = 0; \\ x^2 + y^2 = 1 \end{cases} \qquad \begin{cases} x_1 + x_2 + x_3 = 2 \\ 3x_1 + 2x_2 + 2x_3 = 1 \\ 4x_1 + 3x_2 + 3x_3 = 4 \end{cases}$$

3. Berilgan tengsizliklarni yeching:
$x^2 - 7x + 12 > 0$ $-x^2 + 3x - 1 \ge 0$

4. Berilgan tengsizliklar sistemasini yeching:
$$\begin{cases} \dfrac{3x-2}{4} + 2\dfrac{1}{2} > \dfrac{2x-1}{3} - \dfrac{3x+2}{6} \\ \dfrac{2x-5}{3} - \dfrac{3x-1}{2} < \dfrac{3-x}{5} - \dfrac{2x-1}{4} \end{cases}$$

Variant 26

1. Berilgan tenglamalarni yeching:
   arcsinx+0,5x-1=0 $x(x-15) = 3(108-5x)$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} tg(xy+0{,}1)=x^2; \\ 0{,}9x^2+2y^2=1 \end{cases} \qquad \begin{cases} 2x-3y+\ z=\ \ 2 \\ \ x+5y-4z=-5 \\ 4x+\ \ y-3z=-4 \end{cases}$$

3. Berilgan tengsizliklarni yeching:

$3+4x+8x^2<0$ $\qquad$ $x-x^2-1\geq 0$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} \sqrt{c^2+9c+20}\leq\sqrt{c-1} \\ \ \sqrt{c-1}\leq\sqrt{c^2-13} \end{cases}$$

Variant 27

1. Berilgan tenglamalarni yeching:

$2x^2+\arcsin x+1=0$ $\qquad$ $(x+1)(x^2-x-1)-x^2(x+4)=0$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} tg(xy+0{,}4)=x^2; \\ 0{,}8x^2+2y^2=1 \end{cases} \qquad \begin{cases} 2x_1+\ x_2-\ x_3=\ \ 5 \\ 3x_1-\ \ x_2+2x_3=-5 \\ 7x_1+\ x_2-\ \ x_3=10 \end{cases}$$

3. Berilgan tengsizliklarni yeching:

$2x^2-x-1<0$ $\qquad$ $3x^2+x-4>0$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} \ \sqrt{4b-7}<b \\ \sqrt{b+5}+\sqrt{5-b}>4 \end{cases}$$

Variant 28

1. Berilgan tenglamalarni yeching

$e^{-x}+x^2-2=0$ $\qquad$ $(2x+1)(x-3)-(1-x)(x-5)=29-11x$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} \sin(x+y)=1{,}5x-0{,}1; \\ x^2+y^2=1 \end{cases} \qquad \begin{cases} 3x+2y+\ \ z=5 \\ \ \ x+\ \ y-\ \ z=0 \\ 4x-\ \ y+5z=3 \end{cases}$$

3. Berilgan tengsizliklarni yeching:

$(x+1.5)(x-2)x>0$ $\qquad$ $1.5(x-4)+2.5x<x+6$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} \ \sqrt{3a+2}-3>1 \\ \sqrt{4a^2-4a+1+5}\geq 1 \end{cases}$$

Variant 29

1. Berilgan tenglamalarni yeching:

$2^x-2x^2-1=0$ $\qquad x(2x+5)=0$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} tg(xy+0{,}2)=x^2; \\ 0{,}6x^2+2y^2=1 \end{cases} \qquad \begin{cases} 2x+\ y+4z+8t=-1 \\ \ x+3y-6z+2t=\ 3 \\ 3x-2y+2z-2t=\ 8 \\ 2x+\ y-2z\ \ =\ 4 \end{cases}$$

3. Berilgan tengsizliklarni yeching:

$(3x+1)^4>625$ $\qquad (2x-3)^7\geq 1$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} \sqrt{3a+2}-3>1 \\ \sqrt{4a^2-4a+1+5}\geq 1 \end{cases}$$

Variant 30

1. Berilgan tenglamalarni yeching:

$Cos(2x+1)-3Sinx=0$ $\qquad (x+4)(2x-1)=0$

2. Berilgan tenglamalar sistemasini yeching:

$$\begin{cases} \sin(x+y)-1{,}2x=0{,}1; \\ x^2+y^2=1 \end{cases} \qquad \begin{cases} -x_1+\ x_2+\ x_3-\ x_4=-\ 2 \\ \ x_1+2x_2-2x_3-\ x_4=-\ 5 \\ 2x_1-\ x_2-3x_3+2x_4=-\ 1 \\ \ x_1+2x_2+3x_3-6x_4=-10 \end{cases}$$

3. Berilgan tengsizliklarni yeching:

$\sqrt{x^2-8x}>3$ $\qquad \sqrt{x^2-3x-10}<8-x$

4. Berilgan tengsizliklar sistemasini yeching:

$$\begin{cases} 8c(2+c)(c-2)<(2c-3)(4c^2+6c+9)-5c \\ \left(\frac{1}{4}c+2\right)\left(2-\frac{1}{4}c\right)-\left(3-\frac{1}{4}c\right)\left(\frac{1}{4}c+2\right)>-3 \end{cases}$$

Amaliyot ishi №8.Mathcad paketida va elektron jadvallarda limitlar, differensial tenglamalar, integrallar turli xil usullar bilan hisoblash.

1. $\int \frac{1}{\cos(x)}dx \rightarrow \ln(\sec(x)+\tan(x))$ **2.** $\int_0^{\frac{\pi}{4}} \frac{1}{\cos(x)}dx \rightarrow \ln(\sqrt{2}+1)=0.881$

3. $\int \sqrt{1+x}dx \rightarrow \frac{2}{3}\cdot(x+1)^{\left(\frac{3}{2}\right)}$ **4.** $\int_0^1 \sqrt{1+x}dx=1.219$

5. $\int \frac{1}{(11+5x)^3} \rightarrow \frac{-1}{10\cdot(11+5x)^2}$ **6.** $\int_{-2}^{-1} \frac{1}{(11+5x)^3}dx=0.097$

7. $\int \frac{1}{\sqrt[5]{(3-x)}}\,dx \to \frac{-5}{4}\cdot(3-x)^{\left(\frac{4}{5}\right)}$

8. $\int_{2}^{13} \frac{1}{\sqrt[5]{(3-x)^4}}\,dx = -3.706$

9. $\int \frac{(y-1)}{\sqrt{y}+1}\,dy \to -y+\frac{2}{3}\cdot y^{\left(\frac{3}{2}\right)}$

10. $\frac{(y-1)}{\sqrt{y}+1}\,dy = 7.667$

11. $\int (e^x-1)\cdot e^x\,dx \to -\exp(x)+\frac{1}{2}\cdot\exp(x)^2$

12. $\int (e^x-1)\cdot e^x\,dx = 1.476$

13. $\int \frac{3}{2-x}\,dx \to -3\cdot\ln(2-x)$

14. $\int_{0}^{1} \frac{3}{2-x}\,dx = 2.079$

15. $\int \frac{x}{x^2+1}\,dx \to \frac{1}{2}\cdot\ln(x^2+1)$

16. $\int_{0}^{1} \frac{x}{x^2+1}\,dx = 0.347$

17. $\int \frac{1}{x\cdot\sqrt{1+\ln(x)}}\,dx \to 2\cdot(1+\ln(x))^{\left(\frac{1}{2}\right)}$

18. $\int_{1}^{e^3} \frac{1}{x\cdot\sqrt{1+\ln(x)}}\,dx = 2$

Aniq integrallar

1. $\int_{1}^{2} \frac{1}{x+x^2}\,dx = 0.288$

2. $\int_{\frac{\sqrt{2}}{2}}^{1} \frac{\sqrt{1-x^2}}{x^6}\,dx = 0.533$

3. $\int_{1}^{\sqrt{3}} \frac{\sqrt{1+x^2}}{x^2}\,dx = 0.695$

4. $\int_{1}^{2} \frac{\sqrt{x^2-1}}{x}\,dx = 0.685$

5. $\int_{0}^{1} x^2\cdot\sqrt{1-x^2}\,dx = 0.196$

6. $\int_{0}^{\ln(2)} \sqrt{1-e^{2x}}\,dx = -0.451$

7. $\int_{0}^{1} \sqrt{\left(1-x^2\right)3}dx = 0.589$

8. $\int_{\sqrt{2}}^{2} \frac{1}{x^5\cdot\sqrt{x^2-1}}\,dx = 0.038$

9. $\int_{0}^{3} \frac{1}{(x^2+3)^{\frac{5}{2}}}\,dx = 0.072$

Aniqmas integrallar va ularning turli xil oraliqdagi son qiymatlari.

1. $\int \frac{10x^8+3}{x^4}\,dx \to 2\cdot x^5-\frac{1}{x^3}$

2. $\int_{2}^{6} \frac{10x^8+3}{x^4}\,dx = 1.549\times10^4$

3. $\int \frac{x-2}{x^3}\,dx \to \frac{-1}{x}+\frac{1}{x^2}$

4. $\int_{1}^{2} \frac{x-2}{x^3}\,dx = -0.25$

5. $\int\left(x^2+2x+\frac{1}{x}\right)dx \to \frac{1}{3}\cdot x^3+x^2+\ln(x)$

6. $\int_{1}^{3}\left(x^2+2x+\frac{1}{x}\right)dx = 17.765$

7. $\int \frac{x-1}{\sqrt[3]{x^2}}\,dx \to \frac{3}{4}\cdot(-4+x)\cdot\frac{x}{\left(x^2\right)^{\left(\frac{1}{3}\right)}}$

8. $\int_{3}^{6} \frac{x-1}{\sqrt[3]{x^2}}\,dx = 3.807$

9. $\int \frac{\left(x^2+1\right)^2}{x^3}\,dx \to \frac{1}{2}\cdot x^2+2\cdot\ln(x)-\frac{1}{\left(2\cdot x^2\right)}$

10. $\int_{1}^{3} \frac{\left(x^2+1\right)^2}{x^3}dx = 6.642$

11. $\int\left(\sqrt{x}+\sqrt[3]{x}\right)dx \to \frac{2}{3}\cdot x^{\left(\frac{3}{2}\right)}+\frac{3}{4}\cdot x^{\left(\frac{4}{3}\right)}$

12. $\int_{2}^{5}\left(\sqrt{x}+\sqrt[3]{x}\right)dx = 10.09$

13. $\int \frac{\left(\sqrt{x}-1\right)^3}{x}dx \to \frac{2}{3}\cdot x^{\left(\frac{3}{2}\right)} - 3x + 6\cdot x^{\left(\frac{1}{2}\right)} - \ln(x)$

14. $\int_1^3 \frac{\left(\sqrt{x}-1\right)^3}{x}dx = 0.091$

15. $\int e^x\left(1-\frac{e^{-x}}{x^2}\right)dx \to \exp(x) + \frac{1}{x}$

16. $\int_1^4 e^x\left(1-\frac{e^{-x}}{x^2}\right)dx = 51.13$

17. $\int \frac{x^4}{1+x^2}dx \to \frac{1}{3}\cdot x^3 - x + a\tan(x)$

18. $\int_{-2}^5 \frac{x^4}{1+x^2}dx = 39.814$

19. $\int \sqrt{y+1}dy \to \frac{2}{3}\cdot\left(y+1\right)^{\left(\frac{3}{2}\right)}$

20. $\int_{-1}^3 \sqrt{y+1}dy = 5.333$

21. $\int \frac{x}{\sqrt{x-1}}dx \to 2\cdot\left(x-1\right)^{\left(\frac{1}{2}\right)} + \frac{2}{3}\cdot\left(x-1\right)^{\left(\frac{3}{2}\right)}$

22. $\int_1^6 \frac{x}{\sqrt{x-1}}dx = 11.926$

23. $\int \frac{1}{\sqrt{1+x-x^2}}dx \to a\sin\left[\frac{2}{5}\cdot\sqrt{5}\cdot\left(x-\frac{1}{2}\right)\right]$

24. $\int_5^9 \frac{1}{\sqrt{1+x-x^2}}dx = -0.647i$

25. $\int \frac{1}{\sqrt{2-x^2}}dx \to a\sin\left(\frac{1}{2}\cdot\sqrt{2}\cdot x\right)$

26. $\int_{-1}^2 \frac{1}{\sqrt{2-x^2}}dx = 2.356 - 0.881i$

27. $\int a\sin(x)dx \to x\cdot a\sin(x) + \left(1-x^2\right)^{\left(\frac{1}{2}\right)}$

28. $\int_0^\pi a\sin(x)dx = 3.935 - 2.713i$

29. $\int \frac{x-2}{\sqrt{x^3}}dx \to 2\cdot(x+2)\cdot\frac{x}{\left(x^3\right)^{\left(\frac{1}{2}\right)}}$

30. $\int_3^4 \frac{x-2}{\sqrt{x^3}}dx = 0.226$

Aniqmas integrallar

1. $\int x^2\cdot\sqrt{x^2+4}dx \to \frac{1}{4}\cdot x\cdot(x^2+4)^{\left(\frac{3}{2}\right)} - \frac{1}{2}\cdot x\cdot(x^2+4)^{\left(\frac{1}{2}\right)} - 2\cdot a\sinh\left(\frac{1}{2}\cdot x\right)$

2. $\int \frac{\cos 2x}{\cos(x)\cdot\sin(x)}dx \to \ln(\tan(x))\cdot\cos 2x$

3. $\int \frac{1-\left(\sin(x)\right)^3}{\sin(x)\cdot\sin(x)}dx \to \frac{-1}{\sin(x)}\cdot\cos(x) + \cos(x)$

4. $\int \frac{\sqrt[3]{1+\sqrt[4]{x}}}{\sqrt{x}}dx \to \frac{12}{7}\cdot\left[1+x^{\left(\frac{1}{4}\right)}\right]^{\left(\frac{7}{3}\right)} - 3\cdot\left[1+x^{\left(\frac{1}{4}\right)}\right]^{\left(\frac{4}{3}\right)}$

5. $\int \frac{1}{x\cdot\sqrt{x^2-1}}dx \to -\tan\left[\frac{1}{\left(x^2-1\right)^{\left(\frac{1}{2}\right)}}\right]$

6. $\int \frac{1}{2x^2-6}dx \to \frac{-1}{6}\cdot\sqrt{3}\cdot a\tanh\left(\frac{1}{3}\cdot x\cdot\sqrt{3}\right)$

7. $\int x^2\cdot\ln(x)dx \to \frac{1}{3}\cdot x^3\cdot\ln(x) - \frac{1}{9}\cdot x^3$

8. $\int \frac{1}{\sqrt[3]{5x}}dx \to \frac{3}{10}\cdot x^{\left(\frac{2}{3}\right)}\cdot\sqrt[3]{5^2}$

9. $\int \frac{1}{\sqrt{3-4t^2}}dt \to \frac{1}{2}\cdot a\sin\left(\frac{2}{3}\cdot t\cdot\sqrt{3}\right)$

10. $\int \frac{2x}{x^4+3}dx \to \frac{1}{3}\cdot\sqrt{3}\cdot a\tan\left(\frac{1}{3}\cdot x^2\cdot\sqrt{3}\right)$

11. $\int \frac{2x+3}{x^2-5}dx \to \ln(x^2-5)-\frac{3}{5}\cdot\sqrt{5}\cdot a\tanh\left(\frac{1}{5}\cdot x\cdot\sqrt{5}\right)$

12. $\int \frac{\sin(x)}{\sqrt{1+2\cos(x)}}dx \to -\left(1+2\cdot\cos(x)\right)^{\left(\frac{1}{2}\right)}$

13. $\int \frac{x}{\sqrt[3]{x^2+a}}dx \to \frac{3}{4}\cdot\left(x^2+a\right)^{\left(\frac{2}{3}\right)}$

14. $\int \frac{\sqrt{1+\ln(x)}}{x}dx \to \frac{2}{3}\cdot\left(1+\ln(x)\right)^{\left(\frac{3}{2}\right)}$

15. $\int \frac{1}{\sqrt{e^y+1}}dy \to -2\cdot a\tanh\left[\left(\exp(y)+1\right)^{\left(\frac{1}{2}\right)}\right]$

16. $\int \frac{\left(x^2-1\right)^2}{x^3}dx \to \frac{1}{2}\cdot x^2-2\cdot\ln(x)-\frac{1}{\left(2\cdot x^2\right)}$

17. $\int\left(\frac{1}{\sqrt[3]{x^2}}\right)dx-\int\frac{1}{x\sqrt{x}}dx \to 3\cdot\frac{x}{\left(x^2\right)^{\left(\frac{1}{3}\right)}}+\frac{2}{x^{\left(\frac{1}{2}\right)}}$

18. $\int \frac{\left(2\sqrt{x}+1\right)^2}{x^2}dx \to 4\cdot\ln(x)-\frac{8}{x^{\left(\frac{1}{2}\right)}}-\frac{1}{x}$

19. $\int\left(\frac{1}{x^3}+\frac{1}{x^2}+\frac{1}{x}\right)dx \to \frac{-1}{\left(2x^2\right)}-\frac{1}{x}+\ln(x)$

20. $\int\left(\sin\left(\frac{x}{2}\right)-\cos\left(\frac{x}{2}\right)\right)dx \to -2\cdot\cos\left(\frac{1}{2}\cdot x\right)-2\cdot\sin\left(\frac{1}{2}\cdot x\right)$

21. $\int e^x\left(1+\frac{e^{-x}}{\cos^2 x}\right)dx \to \exp(x)+\frac{1}{cos^2 x}\cdot\ln(x)$

22. $\int a^x\left(1+\frac{a^{-x}}{x^5}\right)dx \to \frac{1}{x^4}\cdot\left(\frac{a^x}{\ln(a)}\cdot x^4-\frac{1}{4}\right)$

Karrali integrallarni hisoblash.

1. $\int_0^a\int_0^{\sqrt{x}} 1\,dydx \to \frac{2}{3}\cdot a^{\left(\frac{3}{2}\right)}$

2. $\int_0^3\int_2^4 3xdxdy \to 54=54$

3. $\int_2^4\int_x^{2x}\frac{y}{x}dydx \to 9=9$

4. $\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-|x|-|y|}dxdy \to 4=4$

5. $\int_1^2\int_0^{\ln y} e^x dxdy \to \exp(\ln y)-1$

6. $\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\frac{1}{1+x^2+y^2}dxdy \to \infty=1\times10^{307}$

7. $\int_{-\infty}^{\infty}\int_{-\infty}^{\infty}\frac{1}{\left(1+x^2+y^2\right)^{\left(\frac{3}{2}\right)}}dxdy \to 2\cdot\pi=6.283$

8. $\int\int 3dxdy \to 3\cdot x\cdot y$

9. $\int\int xdxdy \to \frac{1}{2}\cdot x^2\cdot y$

10. $\int\int\frac{x^2}{7x\cdot y}dxdy \to \frac{1}{14}\cdot x^2\cdot\ln(y)$

Uch karrali aniq va aniqmas integrallar.

1. $\int_0^a \int_0^x \int_0^y xyz\,dzdydx \to \frac{1}{6}\cdot a^3 \cdot xyz$

2. $\int_0^1 \int_0^2 \int_0^3 1\,dxdydz \to 6 = 6$

2. $\int_0^a \int_0^x \int_0^{xy} x^3 \cdot y^3 \cdot z\; dzdydx \to \frac{1}{64}\cdot a^8 \cdot xy^2$

4. $\int_0^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_0^a 1\,dzdydx \to \frac{1}{2}\cdot a \cdot \pi$

5. $\int_0^{e-1} \int_0^{e-x-1} \int_e^{x+y+e} \frac{\ln(z-x-y)}{(x-e)\cdot(x+y-e)}\,dzdydx \to 2\cdot\exp(1) - 5 = 0.437$

6. $\int_0^a \int_0^b \int_0^c (x+y+z)\,dzdydx \to \frac{1}{2}\cdot a^2 \cdot c \cdot b + \frac{1}{2}\cdot b^2 \cdot c \cdot a + \frac{1}{2}\cdot c^2 \cdot b \cdot a$

Integral ostidagi ifodani soddalashtirib, integralni hisoblash

1. $\int \frac{\frac{d}{dx}x^2}{x}\,dx \to 2\cdot x$

2. $\int_0^1 \frac{\frac{d}{dx}x^2}{x}\,dx = 2$

3. $\int \left(\frac{d^2}{dx^2}\sin(x)\right)dx \to \cos(x)$

4. $\int_0^{\pi} \left(\frac{d^2}{dx^2}\sin(x)\right)dx = -2$

5. $\frac{d}{dx}(xdx) \to x$

6. $\frac{d^2}{dx^2}\left(\int_2^3 x^2 dx\right) \to 0 = 0$

7. $\frac{d^2}{dx^2}\left[\int (x+1)^2 dx\right] \to 2\cdot x + 2$

8. $\frac{d}{dx}\left[\int (x+1)^2\,dx\right] \to (x+1)^2$

Amaliyot ishi №9. Mathcadda simvolli xisoblash.

Variant 1

1. x,u,z o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$\ln\left|\left(x - \sqrt{\sin^3\left(x+\frac{\pi}{3}\right)}\right)\right|\left[x - \frac{y^2-1}{z+\frac{x}{x+y}}\right] + \cos\left[tg^2\left[\frac{1}{\sqrt[3]{z+1}}\right]\right]$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$d = \frac{2m + \sin^2(8+x^3)}{\sqrt[3]{8+x^3}}, m = 4, a = -5, b = 5, h = 1.$$

3. x=0,25. Funksiya hosilasini berilgan qiymatda hisoblang:

$$f(x) = \frac{3}{5}x^5 - \frac{1}{2x^4} - \frac{2}{\sqrt[4]{x^3}} + 7;$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{(n+1)^4 + (n-1)^4}{n^4 + 10}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_0^{\frac{\pi}{4}} \frac{1}{\cos(x)}\,dx \to \ln(\sqrt{2}+1) = 0.881 \quad \int_1^4 e^x \left(1 - \frac{e^{-x}}{x^2}\right) dx = 51.13$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \left(\frac{1}{x^3} + \frac{1}{x^2} + \frac{1}{x}\right) dx \to \frac{-1}{\left(2x^2\right)} - \frac{1}{x} + \ln(x) \int \frac{1}{2x^2 - 6}\,dx \to \frac{-1}{6} \cdot \sqrt{3} \cdot a\tanh\left(\frac{1}{3} \cdot x \cdot \sqrt{3}\right)$$

7. Karali integralni hisoblang va natijani solishtiring.

$$\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} e^{-\left(x^2+y^2\right)}\,dx\,dy = 3.142$$

Variant 2

1. x,u,t o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Z = \frac{\sqrt[3]{y^4 - \log_2 |x|}}{10t} - \sin y$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$y = a\lg\left|(b+x)^{1/3} + a\right| + tg75$$

$$a = 30{,}01; b = 20{,}5; x = 1(25)150$$

3. x=0,2 Funksiya hosilasini berilgan qiymatda hisoblang:

$$t(x) = \sqrt[4]{x^2 + Inx}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{\log_a (n+1)!}{\log_a n!} \quad (n > 2,\ a > 1)$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_0^{\frac{\pi}{4}} \frac{1}{\cos(x)}\,dx \to \ln(\sqrt{2}+1) = 0.881 \quad \int_0^1 \sqrt{1+x}\,dx = 1.219$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{\left(x^2-1\right)^2}{x^3}\,dx \to \frac{1}{2} \cdot x^2 - 2 \cdot \ln(x) - \frac{1}{\left(2 \cdot x^2\right)} \quad \int \left(\frac{1}{\sqrt[3]{x^2}}\right) dx - \int \frac{1}{x\sqrt{x}}\,dx \to 3 \cdot \frac{x}{\left(x^2\right)^{\left(\frac{1}{3}\right)}} + \frac{2}{x^{\left(\frac{1}{2}\right)}}$$

7. Karali integralni hisoblang va natijani solishtiring.

$$\int_0^a \int_0^x \int_0^y xyz\,dzdydx \to \frac{1}{6} \cdot a^3 \cdot xyz$$

Variant 3

1. x,t o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Y_2 = \frac{\lg\left|t^2 - x^2\right|}{\cos\frac{\pi}{x^2} - 10{,}3} - \sin t^2$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$z = ax^2 + \left(\frac{ax^2 + b}{\cos 42^0}\right)^{3/5}$$

$a = 0{,}02; b = 35; x = 20(-2)10$

3. x=0,5. Funksiya hosilasini berilgan qiymatda hisoblang:

$$g(x) = \frac{e^x - \sin x}{\cos x + \sqrt{x}};$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \sqrt{n}(\ln(n + 2\sqrt{n} + 1) - \ln n)$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_{-2}^{-1} \frac{1}{(11+5x)^3}\,dx = 0.097 \qquad \int_{2}^{13} \frac{1}{\sqrt[5]{(3-x)^4}}\,dx = -3.706$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{\left(2\sqrt{x}+1\right)^2}{x^2}\,dx \to 4\cdot\ln(x) - \frac{8}{x^{\left(\frac{1}{2}\right)}} - \frac{1}{x} \qquad \int\left(\frac{1}{x^3} + \frac{1}{x^2} + \frac{1}{x}\right)dx \to \frac{-1}{\left(2x^2\right)} - \frac{1}{x} + \ln(x)$$

7. Karali integralni hisoblang va natijani solishtiring.

$$\int_0^1\int_0^2\int_0^3 1\,dx\,dy\,dz \to 6 = 6$$

Variant 4

1. x,u, o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$B = \frac{\left|x^3\right|y^3 + 55{,}5}{\log_3\left|x^3 - y^3\right|} - tg_2 y$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$l = \sqrt{(e^a + \ln|a|)^2 + 1} + \frac{t^2 - 1}{\sin 40^0 * b}$$

$b = 5; a = 4{,}4$

$t = 10(-0{,}1)9$

3. x=0,8. Funksiya hosilasini berilgan qiymatda hisoblang:

$$\frac{\sqrt{x+1.2}}{\sqrt{x^2 + 1.2x + 2.4}}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{(n+k)!+n!}{(n+k)!-n!}$$

5. Aniq integralni hisoblang va natijani solishtiring

$\int (e^x - 1)\cdot e^x dx = 1.476$ $\int_0^1 \frac{3}{2-x} dx = 2.079$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \left(\sin\left(\frac{x}{2}\right) - \cos\left(\frac{x}{2}\right)\right) dx \to -2\cdot\cos\left(\frac{1}{2}\cdot x\right) - 2\cdot\sin\left(\frac{1}{2}\cdot x\right)$ $\int e^x \left(1 + \frac{e^{-x}}{\cos^2 x}\right) dx \to \exp(x) + \frac{1}{cos^2 x}\cdot\ln(x)$

7. Karali integralni hisoblang va natijani solishtiring.

$\int_0^a \int_0^x \int_0^{xy} x^3 \cdot y^3 \cdot z \; dzdydx \to \frac{1}{64}\cdot a^8 \cdot xy^2$

Variant 5

1. x o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$C = \sqrt{\left|Arc\sin\left(\frac{0{,}4 - x^4}{x^2}\right) + 0{,}6\right|}$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$z = \sin^{1/3}\left|\frac{2x-a}{a+b}\right| + \sqrt{\left|b^2 x - a^2\right|}$

$b = 3{,}71; a = 7{,}10$

$x = -0{,}1(-1{,}1) - 10$

3. x=0,3. Funksiya hosilasini berilgan qiymatda hisoblang:

$\frac{\sin^2 x}{\sqrt{2x^2+1}}$

4.Quyidagi limitlarni toping:

$\lim_{n\to\infty} \frac{3n^3+2}{4n^3-1}$

5. Aniq integralni hisoblang va natijani solishtiring

$\int_0^1 \frac{x}{x^2+1} dx = 0.347$ $\int_1^{e^3} \frac{1}{x\cdot\sqrt{1+\ln(x)}} dx = 2$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int a^x \left(1 + \frac{a^{-x}}{x^5}\right) dx \to \frac{1}{x^4}\cdot\left(\frac{a^x}{\ln(a)}\cdot x^4 - \frac{1}{4}\right)$ $\int \frac{1}{\cos(x)} dx \to \ln(\sec(x) + \tan(x))$

7. Karali integralni hisoblang va natijani solishtiring

$\int_0^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_0^a 1 dzdydx \to \frac{1}{2}\cdot a\cdot\pi$

Variant 6

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$D = \log_2\left|\frac{x^2}{y^2} - x^2 + y^2\right| + \frac{x^2}{40{,}7}$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$p = \ln|x| + \ln|x^2 + \sin 35^0| + \frac{\sqrt{\left|\sqrt[3]{1-\cos\frac{\pi}{x}}\right|}}{a+n^2}$$

$a = -0{,}11; n = 22$

$x = 10(5)50$

3. x=0,6. Funksiya hosilasini berilgan qiymatda hisoblang:

$$\frac{3x+0.5}{\sin x}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{2n^3+3}{n^3+n-1}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_{-2}^{5} \frac{x^4}{1+x^2}dx = 39.814 \qquad \int_{-1}^{3} \sqrt{y+1}dy = 5.333$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \sqrt{1+x}dx \to \frac{2}{3}\cdot(x+1)^{\left(\frac{3}{2}\right)} \qquad \int \frac{1}{(11+5x)^3} \to \frac{-1}{10\cdot(11+5x)^2}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_0^{e-1}\int_0^{e-x-1}\int_e^{x+y+e} \frac{\ln(z-x-y)}{(x-e)\cdot(x+y-e)}dzdydx \to 2\cdot\exp(1)-5 = 0.437$$

Variant 7

1. x1,x2 o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$E = x_1 - \arccos\frac{x_2 - 10{,}8}{x_2 + 12}$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$s = \frac{ax^2+bx}{\sqrt{|1+ax^2|}} + e^{\sin 42^0}\arcsin\frac{x}{a}$$

$a = 10{,}12; b = 30$

$x = 10(-2)0$

3. x=0,7. Funksiya hosilasini berilgan qiymatda hisoblang:

$$\sqrt{x+1}\ln(x+1)$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{(n+1)^3}{5n^3+1}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_1^2 \frac{1}{x+x^2}\,dx = 0.288 \qquad \int_{\frac{\sqrt{2}}{2}}^1 \frac{\sqrt{1-x^2}}{x^6}\,dx = 0.533$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{1}{\sqrt[5]{(3-x)}}\,dx \to \frac{-5}{4}\cdot(3-x)^{\left(\frac{4}{5}\right)} \qquad \int \frac{(y-1)}{\sqrt{y}+1}\,dy \to -y+\frac{2}{3}\cdot y^{\left(\frac{3}{2}\right)}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_0^a \int_0^b \int_0^c (x+y+z)\,dzdydx \to \frac{1}{2}\cdot a^2\cdot c\cdot b+\frac{1}{2}\cdot b^2\cdot c\cdot a+\frac{1}{2}\cdot c^2\cdot b\cdot a$$

Variant 8

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$A=\frac{x^2\cdot y^3}{30{,}4-x^3}+arctg\sqrt[3]{\left|y^3-x^2\right|}$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$p=\frac{i_m^2 r}{2}+\frac{i_m^2 r}{2}\cos 2wt$$

$$i_m = 1{,}44; r = 30; w = 45$$

$$t = 0(0{,}5)3$$

3. x=8. Funksiya hosilasini berilgan qiymatda hisoblang:

$$\frac{\ln x}{x\sqrt{1+\ln x}}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{\sqrt[3]{n^2+n}}{4+n}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_1^{\sqrt{3}} \frac{\sqrt{1+x^2}}{x^2}\,dx = 0.695 \qquad \int_1^2 \frac{\sqrt{x^2-1}}{x}\,dx = 0.685$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int (e^x-1)\cdot e^x dx \to -\exp(x)+\frac{1}{2}\cdot\exp(x)^2 \qquad \int \frac{3}{2-x}\,dx \to -3\cdot\ln(2-x)$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_2^4 \int_x^{2x} \frac{y}{x}dydx \to 9 = 9$$

Variant 9

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$F = 50{,}9-\lg\left|\sqrt{\left|y^4\right|}-x^2\right|$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$y = 2\sin^2 x - a^3 \cos 2x + be^{-4x}$

$a = 3{,}15; b = 500;$

$x = 2{,}7(-0{,}25)0{,}2$

3. x=9. Funksiya hosilasini berilgan qiymatda hisoblang:

$tgx - ctgx - 2x - tg\frac{\pi}{6} +$

$ctg\frac{\pi}{6} + \frac{\pi}{3}$

4.Quyidagi limitlarni toping:

$\lim\limits_{n\to\infty} \frac{\sqrt{2n^4 + n^2 + 1}}{2n + n^2 - 1}$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int\limits_0^1 x^2 \cdot \sqrt{1 - x^2}\, dx = 0.196$ $\int\limits_0^{\ln(2)} \sqrt{1 - e^{2x}}\, dx = -0.451$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \frac{x}{x^2 + 1} dx \to \frac{1}{2} \cdot \ln(x^2 + 1)$ $\int \frac{1}{x \cdot \sqrt{1 + \ln(x)}} dx \to 2 \cdot (1 + \ln(x))^{\left(\frac{1}{2}\right)}$

7. Karali integralni hisoblang va natijani solishtiring

$\int\limits_{-\infty}^{\infty} \int\limits_{-\infty}^{\infty} e^{-|x|-|y|} dxdy \to 4 = 4$

Variant 10

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$H = \frac{Arctg\,\frac{x - y}{3x^2}}{y^2 - 1{,}02}$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$z = \frac{tg60^0 \sqrt{\left|1 + \sqrt[5]{x + a}\right|}}{\arcsin\frac{25\pi}{x}} + \lg\left|\frac{x + c}{n}\right|$

$a = 500{,}16; c = 25; n = 30$

$x = 100(-5)80$

3. x=0,1. Funksiya hosilasini berilgan qiymatda hisoblang:

$\frac{\ln^2 x}{x}$

4.Quyidagi limitlarni toping:

$\lim\limits_{n\to\infty} \frac{n!}{(n+1)! - n!}$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_0^1 \sqrt{\left(1-x^2\right)3}dx = 0.589$ $\int_{\sqrt{2}}^2 \frac{1}{x^5 \cdot \sqrt{x^2-1}}dx = 0.038$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \frac{10x^8+3}{x^4}dx \to 2\cdot x^5 - \frac{1}{x^3}$ $\int \frac{x-2}{x^3}dx \to \frac{-1}{x} + \frac{1}{x^2}$

7. Karali integralni hisoblang va natijani solishtiring

$\int_1^2 \int_0^{\ln y} e^x dxdy \to \exp(\ln y) - 1$

Variant 11

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$G = \frac{x^3 - y^3}{\lg\left|x^2\right|} + 1{,}32$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$y = e^{\cos 57^0} tg\frac{x}{\pi} + \frac{a-x^2}{\sqrt[4]{\left|1+\sin x\right|}}$

$a = 25{,}17$

$x = 3(-0{,}1)2$

3. x=0,11. Funksiya hosilasini berilgan qiymatda hisoblang:

$2\sqrt{e^x - 1} - 2arctg\sqrt{e^x - 1}$

4.Quyidagi limitlarni toping:

$\lim_{n\to\infty} \sqrt{n}(\sqrt{n+2} - \sqrt{n-3})$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_0^3 \frac{1}{(x^2+3)^{\frac{5}{2}}}dx = 0.072$ $\int_2^6 \frac{10x^8+3}{x^4}dx = 1.549\times 10^4$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \left(x^2 + 2x + \frac{1}{x}\right)dx \to \frac{1}{3}\cdot x^3 + x^2 + \ln(x)$ $\int \frac{x-1}{\sqrt[3]{x^2}}dx \to \frac{3}{4}\cdot(-4+x)\cdot\frac{x}{\left(x^2\right)^{\left(\frac{1}{3}\right)}}$

7. Karali integralni hisoblang va natijani solishtiring

$\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} \frac{1}{1+x^2+y^2}dxdy \to \infty = 1\times 10^{307}$

Variant 12

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$I = \left|\frac{y-x}{21{,}15}\right|^{2x} \ln 13$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$s = (\ln|ax| - c)^{2/3} + \frac{a+b}{\sqrt[3]{cx^2}}$$

$$a = 10{,}49; c = 0{,}01; b = 100$$

$$x = 10(7)80$$

3. x=1,2. Funksiya hosilasini berilgan qiymatda hisoblang:

$$xe^x \sin x$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{(2n+1)!+(2n+2)!}{(2n+3)!-(2n+2)!}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_1^2 \frac{x-2}{x^3}dx = -0.25 \qquad \int_1^3 \left(x^2 + 2x + \frac{1}{x}\right)dx = 17.765$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{\left(x^2+1\right)^2}{x^3}dx \to \frac{1}{2}\cdot x^2 + 2\cdot\ln(x) - \frac{1}{\left(2\cdot x^2\right)} \qquad \int \left(\sqrt{x} + \sqrt[3]{x}\right)dx \to \frac{2}{3}\cdot x^{\left(\frac{3}{2}\right)} + \frac{3}{4}\cdot x^{\left(\frac{4}{3}\right)}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} \frac{1}{\left(1+x^2+y^2\right)^{\left(\frac{3}{2}\right)}}dxdy \to 2\cdot\pi = 6.283$$

Variant 13

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$J = \left|\sqrt{\left|x^2 - y^2\right|} - x + 21{,}2\right|$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$x = \frac{t-1}{at^2+bt} + \lg\left|t^2 - b^2\right|$$

$$a = 0{,}2; b = 2$$

$$t = -10(3)10$$

3. x=1,3. Funksiya hosilasini berilgan qiymatda hisoblang:

$$\frac{xe^x(\sin x - \cos x) + e^x \cos x - 1}{2}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \sqrt{n^3+8}\left(\sqrt{n^3+2} - \sqrt{n^3-1}\right)$$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_3^6 \frac{x-1}{\sqrt[3]{x^2}}dx = 3.807$ $\int_1^3 \frac{\left(x^2+1\right)^2}{x^3}dx = 6.642$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \frac{\left(\sqrt{x}-1\right)^3}{x}dx \to \frac{2}{3}\cdot x^{\left(\frac{3}{2}\right)} - 3x + 6\cdot x^{\left(\frac{1}{2}\right)} - \ln(x)$ $\int e^x\left(1-\frac{e^{-x}}{x^2}\right)dx \to \exp(x)+\frac{1}{x}$

7. Karali integralni hisoblang va natijani solishtiring

$\int\int 3dxdy \to 3\cdot x\cdot y$

Variant 14

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$K = \frac{\sqrt{2^x + 4^y}}{1{,}3x * \lg\left|\frac{y}{2}\right|}$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$y = (a + \ln|x| + \lg|x|)^3 + \frac{x}{b+x}$

$a = 40{,}22; b = 15$

$x = 10(10{,}5)115$

3. x=14. Funksiya hosilasini berilgan qiymatda hisoblang:

$\frac{x(e^x + e^{-x})}{2} - \frac{e^x - e^{-x}}{2}$

4.Quyidagi limitlarni toping:

$\lim_{n\to\infty}\left(\frac{n}{n^2+1}Sinn! + \frac{2n^2}{1-9n^2}\right)$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_2^5 \left(\sqrt{x} + \sqrt[3]{x}\right)dx = 10.09$ $\int_1^3 \frac{\left(\sqrt{x}-1\right)^3}{x}dx = 0.091$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \frac{x^4}{1+x^2}dx \to \frac{1}{3}\cdot x^3 - x + a\tan(x)$ $\int \sqrt{y+1}dy \to \frac{2}{3}\cdot\left(y+1\right)^{\left(\frac{3}{2}\right)}$

7. Karali integralni hisoblang va natijani solishtiring

$\int\int xdxdy \to \frac{1}{2}\cdot x^2\cdot y$

Variant 15

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$L = \log_5\left|x^2 - y^2\right| - 11{,}5$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$t=\left(\frac{1-ax^2}{1+a^2}\right)^3+\frac{\sqrt{b^2\sin 52^0}}{\sqrt{a\cos 52^0}}$$

$a=70{,}23; b=10{,}15$

$x=15{,}5(0{,}2)17{,}5$

3. x=15,3. Funksiya hosilasini berilgan qiymatda hisoblang:

$$\ln(x+\sqrt{x^2+9})-\ln 3$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{4n-1}{5n+1}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_1^4 e^x\left(1-\frac{e^{-x}}{x^2}\right)dx=51.13 \qquad \int_{-2}^5 \frac{x^4}{1+x^2}dx=39.814$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{x}{\sqrt{x-1}}dx \to 2\cdot(x-1)^{\left(\frac{1}{2}\right)}+\frac{2}{3}\cdot(x-1)^{\left(\frac{3}{2}\right)} \qquad \int \frac{1}{\sqrt{1+x-x^2}}dx \to a\sin\left[\frac{2}{5}\cdot\sqrt{5}\cdot\left(x-\frac{1}{2}\right)\right]$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int\int \frac{x^2}{7x\cdot y}dxdy \to \frac{1}{14}\cdot x^2\cdot\ln(y)$$

Variant 16

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$M=\frac{\sqrt{\left|\sin^2 39^\circ-x^3\right|}}{y^2-31{,}62}$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$s=\sqrt[3]{b^2-tg47^0}+\frac{\sin\frac{\pi}{x}-ax^2}{1+a^2}$$

$a=-12{,}24; b=7{,}77$

$x=5{,}5(-0{,}1)4$

3. x=0,5. Funksiya hosilasini berilgan qiymatda hisoblang:

$$\frac{x^2}{2}arctgx-\frac{x}{2}+\frac{1}{2}arctgx$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{\sqrt{n^2+n}}{n}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_{-1}^{3}\sqrt{y+1}dy = 5.333 \qquad \int_{1}^{6}\frac{x}{\sqrt{x-1}}dx = 11.926$$

6. Aniqmas integralni hisoblang va natijani solishtiring

$$\int\frac{1}{\sqrt{2-x^2}}dx \to a\sin\left(\frac{1}{2}\cdot\sqrt{2}\cdot x\right) \qquad \int a\sin(x)dx \to x\cdot a\sin(x)+\left(1-x^2\right)^{\left(\frac{1}{2}\right)}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_{0}^{a}\int_{0}^{x}\int_{0}^{y} xyz\,dzdydx \to \frac{1}{6}\cdot a^3\cdot xyz$$

Variant 17

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$N = 1{,}73 - \log_{3/2}\left|x^3 - y\right|$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$m = \frac{\left(e^{a^2}+c\right)^{1/3}}{\sin 40^0 + a} + \lg|x-b|\ln|x-b|$$

$$b = 3{,}24; c = 30; a = 2{,}25$$

$$x = 100(-2)80$$

3. x=1. Funksiya hosilasini berilgan qiymatda hisoblang:

$$x\arcsin\sqrt{\frac{x}{1+x}} - \sqrt{x} + arctg\sqrt{x}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{3n^3-4}{n^3+6}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_{5}^{9}\frac{1}{\sqrt{1+x-x^2}}dx = -0.647i \qquad \int_{-1}^{2}\frac{1}{\sqrt{2-x^2}}dx = 2.356 - 0.881i$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int\frac{x-2}{\sqrt{x^3}}dx \to 2\cdot(x+2)\cdot\frac{x}{\left(x^3\right)^{\left(\frac{1}{2}\right)}} \qquad \int x^2\cdot\sqrt{x^2+4}dx \to \frac{1}{4}\cdot x\cdot(x^2+4)^{\left(\frac{3}{2}\right)} - \frac{1}{2}\cdot x\cdot(x^2+4)^{\left(\frac{1}{2}\right)} - 2\cdot a\sinh\left(\frac{1}{2}\cdot x\right)$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_{0}^{1}\int_{0}^{2}\int_{0}^{3} 1\,dxdydz \to 6 = 6$$

Variant 18

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$P = \sin\pi/1{,}8 + \frac{3y + x^2}{x - 20}$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$l = \frac{1 - a^2 t}{1 + c^2} + \arcsin\left(\frac{61 + t^3}{4t^3}\right)$$

$a = 10{,}26; c = 7$

$t = 5{,}1(0{,}15)6{,}6$

3. x=18. Funksiya hosilasini berilgan qiymatda hisoblang: $\frac{1}{\sqrt{2}}\ln\frac{x + 0{,}75 + \sqrt{(x + 0{,}75)^2 - 0{,}0625}}{0{,}75 + \sqrt{0{,}5}}$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{n^2 + n + 1}{(n+1)^2}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_0^{\pi} a\sin(x)dx = 3.935 - 2.713i \qquad \int_3^4 \frac{x - 2}{\sqrt{x^3}}dx = 0.226$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{\cos 2x}{\cos(x)\cdot\sin(x)}dx \to \ln(\tan(x))\cdot\cos 2x \qquad \int \frac{1 - (\sin(x))^3}{\sin(x)\cdot\sin(x)}dx \to \frac{-1}{\sin(x)}\cdot\cos(x) + \cos(x)$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_0^a \int_0^x \int_0^{xy} x^3 \cdot y^3 \cdot z \; dzdydx \to \frac{1}{64}\cdot a^8 \cdot xy^2$$

Variant 19

1. x o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$R = \lg\left|y^3 - \sin x + \frac{x^2}{31{,}94}\right|$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$n = \frac{r^3}{k - x} + \lg(x^2) + \sqrt{\left|\frac{1 + \cos 73^0}{ka}\right|}$$

$r = 12{,}5; k = 35; a = 0{,}27$

$x = 100(-5{,}5)45$

3. x=0,56. Funksiya hosilasini berilgan qiymatda hisoblang:

$$\frac{x\,arctgx}{\sqrt{1 + x^2}}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{(n+1)^4 + (n-1)^4}{n^4 + 10}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_1^5 \sqrt{x-1}dx$ $\int_1^2 \frac{dx}{x^2-4x+5}$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \frac{\sqrt[3]{1+\sqrt[4]{x}}}{\sqrt{x}}dx \to \frac{12}{7}\cdot\left[1+x^{\left(\frac{1}{4}\right)}\right]^{\left(\frac{7}{3}\right)} - 3\cdot\left[1+x^{\left(\frac{1}{4}\right)}\right]^{\left(\frac{4}{3}\right)}$ $\int \frac{1}{x\cdot\sqrt{x^2-1}}dx \to -\tan\left[\frac{1}{\left(x^2-1\right)^{\left(\frac{1}{2}\right)}}\right]$

7. Karali integralni hisoblang va natijani solishtiring

$\int_0^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_0^a 1 dzdydx \to \frac{1}{2}\cdot a\cdot\pi$

Variant 20

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$S = 5\sqrt{\left|x-\sqrt[3]{x^2}\right|} + \frac{2{,}02}{y}$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$t = arctg\frac{y^2+10}{y^3-20} + \frac{ax^2+y}{x^2-y}$

$a = 10{,}28; y = 3{,}7$

$x = 10(-0{,}5)5$

3. x=0,45. Funksiya hosilasini berilgan qiymatda hisoblang:

$\sqrt{1+x^2}arctgx - \ln(x+\sqrt{1+x^2})$

4.Quyidagi limitlarni toping:

$\lim_{n\to\infty}\frac{\sqrt[3]{4n^3+2n-1}}{2n+2}$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_{-1}^4 \frac{x}{\sqrt{x+5}}dx$ $\int_1^e \frac{\sqrt[3]{1+\ln x}}{x}dx$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \frac{1}{2x^2-6}dx \to \frac{-1}{6}\cdot\sqrt{3}\cdot a\tanh\left(\frac{1}{3}\cdot x\cdot\sqrt{3}\right)$ $\int x^2\cdot\ln(x)dx \to \frac{1}{3}\cdot x^3\cdot\ln(x) - \frac{1}{9}\cdot x^3$

7. Karali integralni hisoblang va natijani solishtiring

$\int_0^{e-1}\int_0^{e-x-1}\int_e^{x+y+e} \frac{\ln(z-x-y)}{(x-e)\cdot(x+y-e)}dzdydx \to 2\cdot\exp(1) - 5 = 0.437$

Variant 21

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$T = tg13° - \log_{3/2}\left|y^2 - x^3\right| + 12{,}1$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$z = \lg\left|t^7\right| + \sqrt{\left|1 + a^2 t\right|} + b\sin^2 41^0$

$a = 3{,}29; b = 35$

$t = 25(1)35$

3. x=21. Funksiya hosilasini berilgan qiymatda hisoblang:

$\frac{e^{3x}+1}{e^x+1}$

4.Quyidagi limitlarni toping:

$\lim\limits_{n\to\infty} \frac{\sqrt{2n^2+1}}{\sqrt[4]{n^4+3n-1}}$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int\limits_0^1 \frac{xdx}{\sqrt{1-x^2}}$ $\int\limits_0^1 \frac{dx}{\sqrt{4-x^2}}$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \frac{1}{\sqrt[3]{5x}}dx \to \frac{3}{10}\cdot x^{\left(\frac{2}{3}\right)}\cdot\sqrt[3]{5^2}$ $\int \frac{1}{\sqrt{3-4t^2}}dt \to \frac{1}{2}\cdot a\sin\left(\frac{2}{3}\cdot t\cdot\sqrt{3}\right)$

7. Karali integralni hisoblang va natijani solishtiring

$\int\limits_0^a\int\limits_0^b\int\limits_0^c (x+y+z)\,dzdydx \to \frac{1}{2}\cdot a^2\cdot c\cdot b + \frac{1}{2}\cdot b^2\cdot c\cdot a + \frac{1}{2}\cdot c^2\cdot b\cdot a$

Variant 22

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$U = arctg\sqrt{\left|x - \sqrt[4]{x^2+y^3}\right|} - 12{,}21$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$p = \frac{t^2-a^2}{c^2} + \sin\left(\sqrt{\left|\frac{1+c^2}{t}\right|} + a\right)$

$a = 0{,}30; c = 7$

$t = -1{,}5(0{,}5)3$

3. x=22. Funksiya hosilasini berilgan qiymatda hisoblang:

$\frac{e^{2x}}{2} - e^x + x + 0{,}5$

4.Quyidagi limitlarni toping:

$\lim\limits_{n\to\infty} \frac{(n+1)!+n!}{(n+2)!}$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_0^{\pi/4} \sin 4x dx \qquad \int_1^e x^2 \ln x dx$

6. Aniqmas integralni hisoblang va natijani solishtiring. $\int \frac{2x}{x^4+3} dx \to \frac{1}{3} \cdot \sqrt{3} \cdot a \tan\left(\frac{1}{3} \cdot x^2 \cdot \sqrt{3}\right)$

$\int \frac{2x+3}{x^2-5} dx \to \ln(x^2-5) - \frac{3}{5} \cdot \sqrt{5} \cdot a \tanh\left(\frac{1}{5} \cdot x \cdot \sqrt{5}\right)$

7. Karali integralni hisoblang va natijani solishtiring

$\int_2^4 \int_x^{2x} \frac{y}{x} dy dx \to 9 = 9$

Variant 23

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$V = \cos\left(\log_5 \left|\frac{x}{y}\right|\right) - 22{,}23$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$s = \frac{ax^2 + bx}{\sqrt{|1+ax^2|}} + e^{\sin 42^0} \arcsin \frac{x}{a}$

$a = 10{,}12; b = 30$

$x = 10(-2)0$

3. x=23. Funksiya hosilasini berilgan qiymatda hisoblang:

$\frac{x}{2} - \frac{1}{4} \sin 2x$

4.Quyidagi limitlarni toping:

$\lim_{n\to\infty} \left(\frac{1}{n} Cos \frac{n\pi}{2} + 1\right)$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_0^{\pi} e^x \sin x dx \qquad \int_0^1 \arcsin x dx$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \frac{\sin(x)}{\sqrt{1+2\cos(x)}} dx \to -\left(1+2\cdot\cos(x)\right)^{\left(\frac{1}{2}\right)} \qquad \int \frac{x}{\sqrt[3]{x^2+a}} dx \to \frac{3}{4} \cdot \left(x^2+a\right)^{\left(\frac{2}{3}\right)}$

7. Karali integralni hisoblang va natijani solishtiring

$\int_{-\infty}^{\infty} \int_{-\infty}^{\infty} e^{-|x|-|y|} dx dy \to 4 = 4$

Variant 24

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$W = \lg\left|y^3\right| \frac{3x^2 - 2{,}43}{x^4}$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$l = \frac{tg47^0 \arccos\frac{\pi}{x}}{\sqrt{1+\sqrt{\left|\frac{a-c}{x}\right|}}}$$

$a = 50{,}13; c = 5{,}13$

$x = 10(-0{,}4)6$

3. x=0,37Funksiya hosilasini berilgan qiymatda hisoblang:

$$2\arcsin\frac{x}{2} - \frac{1}{2}\sin(4\arcsin\frac{x}{2})$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{(n+k)!+n!}{(n+k)!-n!}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_0^1 \ln(x+1)dx \qquad \int_0^{\pi/2} \sin x \cos^2 x dx$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{\sqrt{1+\ln(x)}}{x} dx \to \frac{2}{3}\cdot\left(1+\ln(x)\right)^{\left(\frac{3}{2}\right)} \qquad \int \frac{1}{\sqrt{e^y+1}} dy \to -2\cdot a\tanh\left[\left(\exp(y)+1\right)^{\left(\frac{1}{2}\right)}\right]$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_1^2 \int_0^{\ln y} e^x dxdy \to \exp(\ln y) - 1$$

Variant 25

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Y = arctg\frac{y^2 - x^2}{2x + y} - \frac{x^2}{52{,}57}$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$p = \frac{i_m^2 r}{2} + \frac{i_m^2 r}{2}\cos 2wt$$

$i_m = 1{,}44; r = 30; w = 45$

$t = 0(0{,}5)3$

3. x=34 Funksiya hosilasini berilgan qiymatda hisoblang:

$$\frac{x^3}{27}(9\ln^2 x - 6\ln x + 2) - \frac{2}{27}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{2n^3+3}{n^3+n-1}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_0^1 \frac{dx}{e^x+1}$ $\int_0^4 \frac{dx}{1+\sqrt{2x+1}}$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int \frac{10x^8+3}{x^4}dx \to 2\cdot x^5 - \frac{1}{x^3}$ $\int \frac{x-2}{x^3}dx \to \frac{-1}{x}+\frac{1}{x^2}$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} \frac{1}{1+x^2+y^2}dxdy \to \infty = 1\times 10^{307}$$

Variant 26

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Z = \frac{72{,}67}{x^2} - arctg\frac{x-y^3}{10+y}$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$z = \frac{tg60^0\sqrt{\left|1+\sqrt[5]{x+a}\right|}}{\arcsin\frac{25\pi}{x}} + \lg\left|\frac{x+c}{n}\right|$$

$a = 500{,}16; c = 25; n = 30$

$x = 100(-5)80$

3. x=0,35. Funksiya hosilasini berilgan qiymatda hisoblang:

$e^x \cos^2 x$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty}\frac{\sqrt[3]{n^2+n}}{4+n}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$\int_0^1 \frac{x^2dx}{\sqrt{4-x^2}}$ $\int_0^1 \sqrt{1+x^2}dx$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$\int\left(x^2+2x+\frac{1}{x}\right)dx \to \frac{1}{3}\cdot x^3 + x^2 + \ln(x)$ $\int \frac{x-1}{\sqrt[3]{x^2}}dx \to \frac{3}{4}\cdot(-4+x)\cdot\frac{x}{\left(x^2\right)^{\left(\frac{1}{3}\right)}}$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} \frac{1}{\left(1+x^2+y^2\right)^{\left(\frac{3}{2}\right)}}dxdy \to 2\cdot\pi = 6.283$$

Variant 27

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Z_1 = \frac{\log_3 |y^3| - \log_2 |x^2|}{\log x + 12{,}73}$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$p = \left(\frac{t \arcsin \frac{a}{b}}{y^3 + b} \right)^3 - \sqrt[7]{\sin^2 ta}$$

$y = 15; b = 20; a = -0{,}18$

$t = 15; -4; 42; 12{,}4; -3{,}48; -0{,}77; -6; 9$

3. x=0,27. Funksiya hosilasini berilgan qiymatda hisoblang:

$$\frac{x^3}{27}(9\ln^2 x - 6\ln x + 2) - \frac{2}{27}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{(2n+1)! + (2n+2)!}{(2n+3)! - (2n+2)!}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_1^3 \frac{dx}{x + x^2} \qquad \int_1^2 \frac{dx}{2x - 1}$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{1}{\cos(x)} dx \to \ln(\sec(x) + \tan(x)) \qquad \int \sqrt{1+x} dx \to \frac{2}{3} \cdot (x+1)^{\left(\frac{3}{2}\right)}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int\int 3 dx dy \to 3 \cdot x \cdot y$$

Variant 28

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Z_3 = \arcsin \frac{2}{y^2} + 2{,}8 * \ln |x^4|$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$l = \sqrt{(e^a + \ln|a|)^2 + 1} + \frac{t^2 - 1}{\sin 40^0 * b}$$

$b = 5; a = 4{,}4$

$t = 10(-0{,}1)9$

3. x=23. Funksiya hosilasini berilgan qiymatda hisoblang:

$$\frac{x^2 - 1}{(x^2 + 1)\sqrt{x^4 + 1}}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \left(\frac{1}{2n} Cos\, n^3 - \frac{3n}{6n+1}\right)$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_1^e \frac{dx}{x(1+\ln^2 x)} \qquad \int_1^e x\arcsin x dx$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{1}{(11+5x)^3} \to \frac{-1}{10\cdot(11+5x)^2} \qquad \int \frac{1}{\sqrt[5]{(3-x)}} dx \to \frac{-5}{4}\cdot(3-x)^{\left(\frac{4}{5}\right)}$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int\int x dx dy \to \frac{1}{2}\cdot x^2 \cdot y$$

Variant 29

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Z_4 = 2{,}93l^{\cos x^3} + \frac{x^2 - y}{y^3}$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$b = (y^2+1)^{1/7} - \left(\frac{\arcsin\frac{x}{y}}{a^2 x + t}\right)^2$$

$y = 31; a = 2{,}06; t = 18$

$x = 30(-10) - 30$

3. x=0,59. Funksiya hosilasini berilgan qiymatda hisoblang:

$$\frac{e^x(1+\sin x)}{1+\cos x}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{\sqrt{n^2+n}}{n}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_2^3 \frac{dx}{x^2} \qquad \int_0^{\sqrt{3}} \frac{x dx}{\sqrt{4-x^2}}$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int (e^x - 1)\cdot e^x dx \to -\exp(x) + \frac{1}{2}\cdot\exp(x)^2 \qquad \int \frac{3}{2-x} dx \to -3\cdot\ln(2-x)$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int\int \frac{x^2}{7x\cdot y} dx dy \to \frac{1}{14}\cdot x^2 \cdot \ln(y)$$

Variant 30

1. x,u o‘zgaruvchilarga qiymat berib ifodaning qiymatini toping:

$$Z_2 = \frac{x^2 + 3{,}02}{\ln\left|y^2 - x^3\right|}$$

2. [a,b] oraliqda h qadam bilan funksiya qiymatlari jadvalini hosil qiling.

$$y = a\,\lg\left|(b+x)^{1/3} + a\right| + tg75$$

$$a = 30{,}01; b = 20{,}5; x = 1(25)150$$

3. x=24. Funksiya hosilasini berilgan qiymatda hisoblang:

$$e^x tg\frac{x}{2}$$

4.Quyidagi limitlarni toping:

$$\lim_{n\to\infty} \frac{3n^3 - 4}{n^3 + 6}$$

5. Aniq integralni hisoblang va natijani solishtiring.

$$\int_{\frac{\Pi}{8}}^{\frac{\Pi}{6}} \frac{dx}{\cos^2 2x} \qquad \int_1^4 \frac{dx}{(1+\sqrt{x})^2}$$

6. Aniqmas integralni hisoblang va natijani solishtiring.

$$\int \frac{x}{x^2+1}dx \to \frac{1}{2}\cdot\ln(x^2+1)$$

7. Karali integralni hisoblang va natijani solishtiring

$$\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} e^{-|x|-|y|}dxdy \to 4 = 4$$

Amaliyot ishi №10. Mathcad paketida va elektron jadvallarda bir va ikki o‘lchamli funksiyalarning grafigini qurish.

Variant 1

1.Quyidagi funkstiyalar grafiklarini chizing.

5. $y = x^2 + 2x + 1$
6. $y = \sin^2 x$
7. $f(x) = x^2 - 1$ kuk
8. $g(x) = \sin x$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y = -2x + 0{,}5$ va $y = -x^2 - 3x - 1$
4. $y = -x^2 + \frac{x}{2} - 1$ va $y = \sin^2 x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing.

$$f(x)=\begin{cases} x^2-1, & x\le -2 \\ \dfrac{1}{x+2}, & -2<x\le 3 \\ \sqrt{x}, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{9}+z^2=1 \quad x\in[-2;2] \quad y\in[-3;3]$$

$$z=7-2x-y$$

Variant 2

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=x^2-2x+1$
6. $y=-\sin x$
7. $f(x)=\dfrac{x^2-1}{x}$ yashil
8. $g(x)=\cos x$ kora

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=2x+1$ va $y=x^2+3x+0{,}5$
4. $y=-2x^2-x+3$ va $y=-2\sin x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2-1, & x\le -1 \\ \dfrac{1}{x+1}, & -1<x\le 3 \\ \sin x, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2-\sin y}{x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{16}+z^2=1 \quad x\in[-2;2] \quad y\in[-4;4]$$

$$z=8x-6y+5$$

Variant 3

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=4x^2+3x-1$
6. $y=2\sin x$
7. $f(x)=\dfrac{2}{x^2-1}$ xavo rang
8. $g(x)=\sin(x^2+1)$ jigarrang

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=\frac{x}{2}-1$ va $y=-x^2-3x-1$

4. $y=-2x^2-2x+2$ va $y=\sin(-2x)$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2+1, & x\le 1 \\ \frac{1}{x-1}, & 1<x\le 5 \\ \sqrt{x-5}, & x>5 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2+y}{x-y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{25}+z^2=1 \quad x\in[-2;2] \quad y\in[-5;5]$$

$$z=4x+3y-8$$

Variant 4

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=x^2-3x+1$

6. $y=\sin 2x$

7. $f(x)=\frac{x+1}{x}$ siyoxrang

8. $\mathrm{g(x)}=2^{x+1}$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=x+2$ va $y=-x^2-2x-1$

4. $y=-x^2+\frac{x}{2}-1$ va $y=\sin^2 x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} \sqrt{x^2-1}, & x\le -2 \\ \frac{1}{x+2}, & -2<x\le 3 \\ \sin x, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{xy^2}{x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{36}+z^2=1 \quad x\in[-2;2] \quad y\in[-6;6]$$

$$z=2x-3y+7$$

Variant 5

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=-x^2-x+2$

6. $y=\sin x$

7. $f(x)=x^2-2$ yashik

8. $g(x)=\text{In x}$ xavo rang

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=-2x-2$ va $y=-2x^2+2x-1$

4. $y=x^2+\frac{x}{3}-2$ va $y=\cos x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases}x^2-4, & x\le -2\\ \dfrac{3}{x+2}, & -2<x\le 3\\ \cos x, & x>3\end{cases}$$

4.Berilgan sirtni yasang.

$$\text{F(x, y)}=\frac{x^2-\sin y}{x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9}+\frac{y^2}{4}+z^2=1 \quad x\in[-3;3] \quad y\in[-2;2]$$

$$z=x+5y-2$$

Variant 6

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=x^2+3x+0{,}5$

6. $y=-\cos 2x-0{,}5$

7. $f(x)=x^3-1$ jigarrang

8. $g(x)=\sin(\text{x}-3)$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=-x+2$ va $y=-2x^2-3x+1$

4. $y=\frac{x^2}{2}-x+1$ va $y=\cos 2x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases}(x-1)^2, & x\le -3\\ \dfrac{-2}{x+3}, & -3<x\le 4\\ \sqrt{x}, & x>4\end{cases}$$

4.Berilgan sirtni yasang.

$$\text{F(x, y)}=\frac{x^2+\cos y}{x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{9}+\frac{y^2}{25}+z^2=1 \quad x\in[-3;3] \quad y\in[-5;5]$

$z=5x-3y-4$

Variant 7

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=x^2+4x+1{,}5$
2. $y=\cos 2x-0{,}5$
3. $f(x)=x^3+2$ kuk
4. $g(x)=\cos(x+3)$ kora

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=-x+3$ va $y=-2x^2-x+3$
4. $y=-\frac{x^2}{2}-x+1$ va $y=2\cos x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2-1, & x\le -2 \\ \dfrac{1}{x+2}, & -2<x\le 3 \\ \sqrt{x}, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2+\sqrt{y}}{x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{9}+\frac{y^2}{36}+z^2=1 \quad x\in[-3;3] \quad y\in[-6;6]$

$z=x+5y+8$

Variant 8

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=-x^2-x+0{,}5$
6. $y=-\sin 2x-0{,}5$
7. $f(x)=3(x^3-2)$ siyoxrang
8. $g(x)=\cos^2(\mathrm{x}\text{-}1)$ kora

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=-x+5$ va $y=-x^2+\frac{x}{2}-1$
4. $y=x^2-2x-\frac{4}{5}$ va $y=\cos^2 x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2-1, & x\le -1 \\ \dfrac{1}{x+1}, & -1<x\le 3 \\ \sin x, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2-y}{x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{16}+\frac{y^2}{4}+z^2=1 \quad x\in[-4;4] \quad y\in[-2;2]$$

$$z=4y-3x-5$$

Variant 9

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=-x^2-2x-1$
6. $y=\sin 2x-0{,}5$
7. $f(x)=2(x^3+1)$ kuk
8. $g(x)=\sin^2(x+1)$ yashil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=-x+6$ va $y=x^2+\dfrac{x}{3}-2$

4. $y=-x^2-\dfrac{x}{3}+1$ va $y=-\cos x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2+1, & x\le 1 \\ \dfrac{1}{x-1}, & 1<x\le 5 \\ \sqrt{x-5}, & x>5 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{x-y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{9}+z^2=1 \quad x\in[-2;2] \quad y\in[-3;3]$$

$$z=7-2x-y$$

Variant 10

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=-x^2-3x-1$
6. $y=-\cos 2x+0{,}5$
7. $f(x)=\dfrac{2}{x^2-1}$ xavo rang

8. $g(x) = Inx$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y = x + 3$ va $y = \frac{x^2}{2} - x + 1$

4. $y = \frac{x^2}{3} - 2x + 1$ va $y = -\cos 2x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x) = \begin{cases} \sqrt{x^2 - 1}, & x \le -2 \\ \frac{1}{x+2}, & -2 < x \le 3 \\ \sin x, & x > 3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x, y)} = \frac{x^2 - \cos y}{x + y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{4} + \frac{y^2}{16} + z^2 = 1 \quad x \in [-2;2] \quad y \in [-4;4]$

$z = 8x - 6y + 5$

Variant 11

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y = -2x^2 + 2x - 1$

6. $y = \cos 2x + 0{,}5$

7. $f(x) = x^3 - 1$ jigarrang

8. $g(x) = sin^3(\mathrm{x} + 1)$ yashil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y = 2x + 2$ va $y = -\frac{x^2}{2} - x + 1$

4. $y = -\frac{x^2}{3} - 2x + 1$ va $y = -2\cos x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x) = \begin{cases} x^2 - 4, & x \le -2 \\ \frac{3}{x+2}, & -2 < x \le 3 \\ \cos x, & x > 3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x, y)} = \frac{x^2 - \sin y}{x + y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{4}+\frac{y^2}{25}+z^2=1 \quad x\in[-2;2] \quad y\in[-5;5]$

$z=4x+3y-8$

Variant 12

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y=-2x^2-3x+1$
2. $y=-\sin 2x+0{,}5$
3. $f(x)=x^2-1$ kuk
4. $g(x)=sin(x^2+1)$ jigarrang

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=2x+3$ va $y=x^2-2x-\frac{4}{5}$
4. $y=4x^2+3x-1$ va $y=\sin x+0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases}(x-1)^2, & x\le -3\\ \dfrac{-2}{x+3}, & -3<x\le 4\\ \sqrt{x}, & x>4\end{cases}$$

4.Berilgan sirtni yasang.

$F(x,\ y)=\frac{x^2+\cos y}{x+y}$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{4}+\frac{y^2}{36}+z^2=1 \quad x\in[-2;2] \quad y\in[-6;6]$

$z=2x-3y+7$

Variant 13

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=-2x^2-x+3$
6. $y=\sin 2x+0{,}5$
7. $f(x)=2(x^3+1)$ kuk
8. $g(x)=\sin x$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=2x-\frac{1}{4}$ va $y=-x^2-\frac{x}{3}+1$
4. $y=x^2-2x+1$ va $y=\sin x-0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2-1, & x\le -2 \\ \dfrac{1}{x+2}, & -2<x\le 3 \\ \sqrt{x}, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2+\cos y}{x-y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9}+\frac{y^2}{4}+z^2=1 \quad x\in[-3;3] \quad y\in[-2;2]$$

$$z=x+5y-2$$

Variant 14

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=-2x^2-2x+2$
6. $y=-\cos x-0{,}5$
7. $f(x)=\dfrac{x^2-1}{x}$ yashil
8. $g(x)=2^{x+1}$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=3x+0{,}5$ va $y=\dfrac{x^2}{3}-2x+1$
4. $y=-x^2-x+2$ va $y=-\sin x+0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2-1, & x\le -1 \\ \dfrac{1}{x+1}, & -1<x\le 3 \\ \sin x, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{\sin y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9}+\frac{y^2}{25}+z^2=1 \quad x\in[-3;3] \quad y\in[-5;5]$$

$$z=5x-3y-4$$

Variant 15

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=-x^2+\dfrac{x}{2}-1$
6. $y=-\cos x+0{,}5$
7. $f(x)=x^3-1$ jigar rang

8. $g(x)=\cos^2(x-1)$ javo rang

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=4x-1$ va $y=-\frac{x^2}{3}-2x+1$

4. $y=x^2-3x+1$ va $y=-\sin x-0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2+1, & x\le 1 \\ \dfrac{1}{x-1}, & 1<x\le 5 \\ \sqrt{x-5}, & x>5 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{\sin y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9}+\frac{y^2}{36}+z^2=1 \quad x\in[-3;3] \quad y\in[-6;6]$$

$$z=x+5y+8$$

Variant 16

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=x^2+\frac{x}{3}-2$

6. $y=\cos x-0{,}5$

7. $f(x)=\frac{x+1}{x}$ siyoxrang

8. $g(x)=\sin(x-3)$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=-3x+1$ va $y=4x^2+3x-1$

4. $y=x^2+2x+1$ va $y=\cos x+0{,}5$

3.i Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} \sqrt{x^2-1}, & x\le -2 \\ \dfrac{1}{x+2}, & -2<x\le 3 \\ \sin x, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{\sin x}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{16}+\frac{y^2}{4}+z^2=1 \quad x\in[-4;4] \quad y\in[-2;2]$$

$$z=4y-3x-5$$

Variant 17

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y = \frac{x^2}{2} - x + 1$

6. $y = \cos x + 0{,}5$

7. $f(x) = 3(x^3 - 2)$ siyoxrang

8. $g(x) = \cos x$ kora

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y = \frac{x}{4} + 3$ va $y = x^2 - 2x + 1$

4. $y = \frac{x^2}{3} + x + 2$ va $y = \cos x - 0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x) = \begin{cases} x^2 - 4, & x \le -2 \\ \frac{3}{x+2}, & -2 < x \le 3 \\ \cos x, & x > 3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x, y)} = \frac{x^2 y}{\cos x + y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{4} + \frac{y^2}{9} + z^2 = 1 \quad x \in [-2;2] \quad y \in [-3;3]$

$z = 7 - 2x - y$

Variant 18

1.Quyidagi funkstiyalar grafiklarini chizing

1. $y = -\frac{x^2}{2} - x + 1$

2. $y = -\sin x - 0{,}5$

3. $f(x) = \frac{3x^2}{1+x}$ kizil

4. $g(x) = Cosx$ kora

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y = -\frac{x}{4} - 1$ va $y = -x^2 - x + 2$

4. $y = -\frac{x^2}{3} - x + 4$ va $y = -\cos x + 0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x) = \begin{cases} (x-1)^2, & x \le -3 \\ \frac{-2}{x+3}, & -3 < x \le 4 \\ \sqrt{x}, & x > 4 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x, y)} = \frac{x^2 y}{\cos x - y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{4}+\frac{y^2}{16}+z^2=1 \quad x\in[-2;2] \quad y\in[-4;4]$

$z=8x-6y+5$

Variant 19

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=x^2-2x-\frac{4}{5}$

6. $y=-\sin x+0{,}5$

7. $f(x)=2x^3-\sin x$ sarik

8. $g(x)=x-1$ kuk

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=-\frac{x}{5}+0{,}5$ va $y=x^2-3x+1$

4. $y=\frac{x^2}{2}+\frac{x}{3}-1$ va $y=-\cos x-0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases}x^2-1, & x\le -2\\ \dfrac{1}{x+2}, & -2<x\le 3\\ \sqrt{x}, & x>3\end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{x+\cos y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{4}+\frac{y^2}{25}+z^2=1 \quad x\in[-2;2] \quad y\in[-5;5]$

$z=4x+3y-8$

Variant 20

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=-x^2-\frac{x}{3}+1$

6. $y=\sin x-0{,}5$

7. $f(x)=\sin^2 x-1$ kizil

8. $g(x)=x^3+1$ sarik

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=-\frac{x}{5}+0{,}5$ va $y=x^2+2x+1$

4. $y=\frac{x^2}{3}+\frac{x}{2}-2$ va $y=\sin 2x+0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2-1, & x\le -1 \\ \dfrac{1}{x+1}, & -1<x\le 3 \\ \sin x, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,\ y)}=\frac{x^2-y}{x+\sin y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{36}+z^2=1 \quad x\in[-2;2] \quad y\in[-6;6]$$

$$z=2x-3y+7$$

Variant 21

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=\dfrac{x^2}{3}-2x+1$
6. $y=\sin x+0{,}5$
7. $f(x)=\log x$ kuk
8. $g(x)2Sinx$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=\dfrac{x}{5}+1$ va $y=\dfrac{x^2}{3}+x-1$
4. $y=-\dfrac{x^2}{2}-\dfrac{x}{3}-3$ va $y=-\sin 2x+0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2+1, & x\le 1 \\ \dfrac{1}{x-1}, & 1<x\le 5 \\ \sqrt{x-5}, & x>5 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,\ y)}=\frac{x^2y}{\sin x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9}+\frac{y^2}{4}+z^2=1 \quad x\in[-3;3] \quad y\in[-2;2]$$

$$z=x+5y-2$$

Variant 22

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=-\dfrac{x^2}{3}-2x+1$
6. $y=-2\cos x$

7. $f(x)=tg(x+1)$ sarik

8. $g(x)x^2$ $2/3$ kuk

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=5x-0{,}5$ va $y=\frac{x^2}{3}+x+2$

4. $y=-x^2+\frac{x}{4}-0{,}5$ va $y=\cos 2x+0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases}\sqrt{x^2-1}, & x\le -2\\ \dfrac{1}{x+2}, & -2<x\le 3\\ \sin x, & x>3\end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,\ y)}=\frac{x^2+y}{x-\cos y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9}+\frac{y^2}{25}+z^2=1 \quad x\in[-3;3] \quad y\in[-5;5]$$

$$z=5x-3y-4$$

Variant 23

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=\frac{x^2}{3}+x-1$

6. $y=-\cos 2x$

7. $f(x)=tg(x+1)$ sarik

8. $g(x)\frac{1+x^2}{x^2}$ yashil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=5x-4$ va $y=-\frac{x^2}{3}-x+4$

4. $y=-x^2-\frac{x}{4}+3{,}5$ va $y=-\cos 2x+0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases}x^2-4, & x\le -2\\ \dfrac{3}{x+2}, & -2<x\le 3\\ \cos x, & x>3\end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,\ y)}=\frac{xy^2}{\sin x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{9}+\frac{y^2}{36}+z^2=1 \quad x\in[-3;3] \quad y\in[-6;6]$

$z=x+5y+8$

Variant 24

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=\frac{x^2}{3}+x+2$

6. $y=-\cos x$

7. $f(x)=2(x^2+1)$ yashil

8. $g(x)=\cos x+1$yashil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=6x-\frac{3}{2}$ va $y=\frac{x^2}{2}+\frac{x}{3}-1$

4. $y=x^2+3x+0{,}5$ va $y=\sin 2x-0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases}(x-1)^2, & x\le -3\\ \frac{-2}{x+3}, & -3<x\le 4\\ \sqrt{x}, & x>4\end{cases}$$

4.Berilgan sirtni yasang.

$\mathrm{F(x,y)}=\frac{xy^2}{x+\sin y}$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$\frac{x^2}{16}+\frac{y^2}{4}+z^2=1 \quad x\in[-4;4] \quad y\in[-2;2]$

$z=4y-3x-5$

Variant 25

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=-\frac{x^2}{3}-x+4$

6. $y=\cos^2 x$

7. $f(x)=x^3-1$ jigar rang

8. $g(x)=\cos^2(x-1)$ javo rang

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=\frac{2x}{3}+1$ va $y=\frac{x^2}{3}+\frac{x}{2}-2$

4. $y=\frac{x^2}{3}+x-1$ va $y=-\sin 2x-0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2-1, & x\le -2 \\ \dfrac{1}{x+2}, & -2<x\le 3 \\ \sqrt{x}, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{xy^2}{x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{25}+z^2=1 \quad x\in[-2;2] \quad y\in[-5;5]$$

$$z=4x+3y-8$$

Variant 26

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=\dfrac{x^2}{2}+\dfrac{x}{3}-1$

6. $y=2\cos x$

7. $f(x)=2(x^3+1)$ kuk

8. $g(x)=\sin^2(x+1)$ yashil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=\dfrac{3x}{2}-1$ va $y=-\dfrac{x^2}{2}-\dfrac{x}{3}-3$

4. $y=x^2+4x+1{,}5$ va $y=\cos 2x-0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2-1, & x\le -1 \\ \dfrac{1}{x+1}, & -1<x\le 3 \\ \sin x, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{xy^2}{\cos x+y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{16}+z^2=1 \quad x\in[-2;2] \quad y\in[-4;4]$$

$$z=8x-6y+5$$

Variant 27

5. $y=\dfrac{x^2}{3}+\dfrac{x}{2}-2$

6. $y=\cos 2x$

7. $f(x)=\dfrac{x+1}{x}$ siyoxrang

8. $\mathrm{g(x)}=2^{x+1}$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=\frac{x}{2}+\frac{2}{3}$ va $y=-x^2+\frac{x}{4}-0{,}5$

4. $y=-x^2-x+0{,}5$ va $y=-\cos 2x-0{,}5$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} x^2+1, & x\le 1 \\ \dfrac{1}{x-1}, & 1<x\le 5 \\ \sqrt{x-5}, & x>5 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,y)}=\frac{x^2y}{x+\cos y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{25}+z^2=1 \quad x\in[-2;2] \quad y\in[-5;5]$$

$$z=4x+3y-8$$

Variant 28

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=-\frac{x^2}{2}-\frac{x}{3}-3$

6. $y=\cos x$

7. $f(x)=x^2-1$ kuk

8. $g(x)=\sin x$ kizil

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y=-8x+1$ va $y=-x^2-\frac{x}{4}+3{,}5$

4. $y=-x^2-2x-1$ va $y=\sin x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x)=\begin{cases} \sqrt{x^2-1}, & x\le -2 \\ \dfrac{1}{x+2}, & -2<x\le 3 \\ \sin x, & x>3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x,\ y)}=\frac{x^2-y}{\sin y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{4}+\frac{y^2}{36}+z^2=1 \quad x\in[-2;2] \quad y\in[-6;6]$$

$$z=2x-3y+7$$

Variant 29

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y=-x^2+\frac{x}{4}-0{,}5$

6. $y = \sin(-2x)$

7. $f(x) = \dfrac{3x^2}{1+x}$ kizil

8. $g(x) = Cosx$ kora

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y = x + 3$ va $y = \dfrac{x^2}{2} - x + 1$

4. $y = -x^2 - 3x - 1$ va $y = \sin 2x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x) = \begin{cases} x^2 - 4, & x \le -2 \\ \dfrac{3}{x+2}, & -2 < x \le 3 \\ \cos x, & x > 3 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x, y)} = \frac{x^2 y}{x + \cos y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9} + \frac{y^2}{4} + z^2 = 1 \quad x \in [-3;3] \quad y \in [-2;2]$$

$$z = x + 5y - 2$$

Variant 30

1.Quyidagi funkstiyalar grafiklarini chizing

5. $y = -x^2 - \dfrac{x}{4} + 3{,}5$

6. $y = -2\sin x$

7. $f(x) = tg(x+1)$ sarik

8. $g(x) x^{2\,2/3}$ kuk

2. Funkstiyalar grafiklarini chizing va ularning kesishish nuqtalarini aniqlang.

3. $y = -x + 2$ va $y = -2x^2 - 3x + 1$

4. $y = -2x^2 + 2x - 1$ va $y = 2\sin x$

3. Bo‘laklab berilgan funkstiyaning grafigini chizing

$$f(x) = \begin{cases} (x-1)^2, & x \le -3 \\ \dfrac{-2}{x+3}, & -3 < x \le 4 \\ \sqrt{x}, & x > 4 \end{cases}$$

4.Berilgan sirtni yasang.

$$\mathrm{F(x, y)} = \frac{\cos x + y^2}{x + y}$$

5.Berilgan sirt va tekislikni kesishishini grafik ko‘rinishda tasvirlang.

$$\frac{x^2}{9} + \frac{y^2}{25} + z^2 = 1 \quad x \in [-3;3] \quad y \in [-5;5]$$

$$z = 5x - 3y - 4$$

IV. TESTLAR

Test topshirig'i	javob	javob	javob	javob
Windows operasion tizimining bosh menysi ga qaysi tugma (knopka) orqali murojaat qilinadi	ПУСК tugmasi yordamida	Контекст meny yordamida	Мой компьютер yordamida	Мои документы papkasi yordamida
Korzinaga tashlashni qanday buyruq bilan almashtirsa bo'ladi?	Delete (O'chirish)	Goto	Сохранить	Esc
Windows 95 dan boshlab qanday nomlanadi?	Operasion tizim	Qobiq dastur	Ilova dastur	Qo'shma dastur
Qaysi tugmalar yordamida barcha fayllar belgilanadi?	Ctrl + A	Ctrl + S	Alt + O	Tab + Shift
Obyektning kontekst menyusini chiqarish uchun…	Sichqon o'ng tugmasi 1 marta bosiladi	Sichqon chap tugmasi 2 marta bosiladi	Sichqon o'ng tugmasi 2 marta bosiladi	Sichqon chap tugmasi bosib suriladi
Windows 3.11 va Windows 98 lar orasidagi asosiy farqlardan biri?	Windows 3.11 qobiq dastur, Windows 98 operasion sistema	Windows 3.11 yordamchi dastur, Windows 98 kobiq dastur	Windows 3.11 qobiq dastur, Windows 98 yordamchi dastur	Farqi yo'q
Ish stolida joylashgan dasturni ochish uchun nima qilish kerak?	Belgi ustida sichqon chap tugmasini 2 marta bosish	Belgi ustida sichkon chap tugmasini 1 marta bosish	Belgi ustida sichkon ung tugmasini 1 marta bosish	Belgi ustida sichkon ung tugmasini 2 marta bosish
Korzinaga tashlangan axborotni…	Tiklash, o'chirish mumkin	Tiklash, surish mumkin	Ko'chirish, surish mumkin	Nusxalash, surish mumkin
Darchalarni nimalardan foydalanib yopish qulay?	Masalalar panelidan va X (Закрыть) tugmasi yordamida	Ctrl + Shift	Alt + Shift	Ish stolidan va X yordamida
Tizim bosh menysining «Найти» bo'limi yordamida qanday ob'ektlarni qidirish mumkin?	Fayl va papkani	faqat faylni	faqat papkani	fayl va diskni

Tashqi va local diskdagi ma’lumotlar hajmini ko‘rish qanday amalga oshiriladi?	Kontekst menydagi Свойства bo‘limidan	Kontekst menydagi Проводник bo‘limidan	Kontekst menydagi Общий доступ и безопасность bo‘limidan	Kontekst menydagi Переименовать bo‘limidan
Ish stolidagi biror piktogrammaga tegishli xossalarni ko‘rish uchun	Ustida sichqon o‘ng tugmasi bosiladi	Esc bosiladi	Ustida sichqon chap tugmasi bosiladi	Enter bosiladi
Windows operasion sistemasida masalalar qatori asosan ekranning qaerida joylashgan?	Pastda	Chapda	O‘ngda	Yuqori qismida
Windows bosh tavsiyanomasi qanday ishga tushiriladi?	Пуск tugmasidan	"Мой компьютер " piktogrammasidan	"Мои документы" papkasidan	Проводникдан
Windowsda kontekst menyu qanday chaqiriladi?	Sichqon o‘ng tugmasi yordamida	Sichqon chap tugmasi yordamida	Пуск tugmasi yordamida	Проводник yordamida
Windows da papka qanday yaratiladi?	Kontekst menyu/ Создать папку	Kontekst menyu/ Создать ярлык	Kontekst menyu/ Свойства/ изменить значок	Пуск/ Программы
Qaysi bo‘lim Windows XP bosh tavsiyanomasiga tegishli emas?	Вставка	Интернет	Мои документы	Все программы
Dastur nima?	Kompyuter tilida yozilgan algoritm	Buyruq	Interfeys	Kompyuter bilan inson muloqoti
Hujjatni saqlash muloqot darchasida nimalar kiritiladi (ko‘rsatiladi)?	Nomi, tipi, o‘rni	Tipi, o‘rni	Nomi,tipi	Nomi, o‘rni
Pusk tugmasi qaerda joylashgan?	Masalalar panelida	Vositalar panelida	Moi dokumenti papkasida	Ilova dastur darchasida
CDROM nima?	Kompakt diskni o‘quvchi qurilma	Kattiq diskni o‘quvchi qurilma	Kompyuterga dasturni kirituvchi tugma	Kompyuterga ma’lumotni kirituvchi tugma
Sichqonchaning vazifasi nimadan iborat?	Foydalanuvchi bilan kompyuter o‘rtasidagi muloqotni osonlashtiradi	Ma’lumotni xotiraga saqlaydi	Ma’lumotni kiritilishini sekinlantiradi	Ma’lumotni q’og’ozga chiqaradi
Qanday dastur kompyuterni	Virus	MS DOS	LEXICON	WINDOWS

zararlantiradi?				
"Kompyuter" ma’nosi nimani anglatadi?	Hisoblovchi	Ekran	Formula	Darcha
Bosh menyu vazifasi nimadan iborat?	Ilova va hujjatlarga murojaat etish	Kompyuterga ma’lumotni kiritish qurilmasi	Rasmlarni chizadi	Kompyuter qurilmalari ustidan nazorat qilish
Plotterning vazifasi nimadan iborat?	Katta o‘lchamli tasvir va grafiklarni bosmaga chiqarish	Ma’lumotni kiritish qurilmasi	Kogozga ma’lumotni Chop etish	Ma’lumotni ekranga chiqaradi
Qaysi tugmalar kombinatsiyasi yordamida darchalarni yopish mumkin?	Alt+F4	Shift +F4	Shift+F5	Alt+F5
Axbort o‘lchashda eng kichik o‘lchov birligi nima?	bit	bod	bayt	Kbayt
1 bayt nimaga teng?	8 bit	10 Kbayt	10 bit	1 bod
O‘nlik sanoq sistemasidagi 5 soni ikkilik sanoq sistemasida qanday yoziladi?	101	110	111	100
O‘nlik sanoq sistemasidagi 2 soni ikkilik sanoq sistemasida qanday yoziladi?	10	00	01	11
Bit nima?	Axborotning eng kichik o‘lchov birligi	Mantiqiy element	Dasturlash tili konstantasi	Algoritm elementi
1 Kbayt nimaga teng?	1024 bayt	1000 bayt	1024 bit	1000 bit
AXBOROT TEXNOLOGIYALARI so‘zida necha bayt bor?	22	192	25	2
MEGABAYT so‘zida necha bit bor?	64	32	8	24
1 Gbayt nimaga teng?	1024 Mbayt	103 Mbayt	1000 Mbit	1 000 000 Kbayt
Word nima?	matn taxrirlagich	yordamchi dastur	elektron jadval	operasion sistema
Matn taxrirlagichlarni asosan necha turga ajratish mumkin?	3	2	4	5
Klaviaturada mavjud bo‘lmagan belgilarni o‘rnatish?	Вставка символ	Вставка надпись	Вставка, объект	Вставка, рисунок
info@tashit.uz elektron pochta manzilidagi «info» so‘zi nimani anglatadi?	Foydalanuvchi nomi	Kompyuter nomi	Server nomi	Domen nomi
Ms Access nima?	Malumotlar bazasi	Qobiq dastur	Matn taxrirlagich	Operasion tizim
Access Windows uchun	Ilova dastur	Yordamchi	Boshqaruvchi	Aloqasi yo‘q

nima?		dastur	dastur	dastur
Access qaysi modelida berilganlar daraxt struktura ko‘rinishida tasvirlanadi?	ierarxik	tarmoqli	relyatsion	relyatsion va tarmoqli
Accessning tarjimasi nima?	Доступ	Вход	Обработка	Шаблон
Access dasturida yangi bazaning jadvalini quyidagicha yaratish mumkin:	Конструктор, мастер, ввод данных	Формы, мастер, копирования	Конструктор, мастер, копирования	мастер, ввод данных , структурирование
Ms Access dasturi qanday ishga tushiriladi?	Пуск/Программы/ Ms Access	Пуск/Программы /Ms Word	Пуск/Программы /Ms Excel	Пуск/Программы /Ms Power Point
Конструктор jadval yaratish darchasi qaysi uch bo‘limdan tashkil topgan (Ms Access)?	Имя поля, тип данных, описания	Имя поля, пустые строки, общие	тип данных, обязательное поле, текстовый	Дата/время, тип данных, имя поля
Boshqa bazadan jadvallarni ishlatish uchun (Ms Access):	Файл, внешние данные, импорт, связь с таблицами	Правка, внешние данные, импорт, связь с таблицами	Формат, внешние данные, импорт, связь с таблицами	Сервис, внешние данные, импорт, связь с таблицами
Berilgan bazaning va jadvallarning hujjatini yaratish uchun (Ms Access):	Сервис, анализ, архивариус	Сервис, анализ, таблицы	Сервис, анализ, отчет	Сервис, анализ, формы
Jadvallararo bog’lash quyidagicha amalga oshiriladi (Ms Access):	Сервис, схема данных	Правка, схема данных	Файл, схема данных	Вид, схема данных
Internet global tarmog’i deb nimaga aytiladi (komp. tarmoq)?	turli shaxar va mamlakatlardagi kompyuterlar bog’lanishi	Ikkita katta binodagi kompyuterlar bog’lanishi	biror inshoatning turli qavatlarida joylashgan kompyuterlar bog’lanishi	to‘g’ri javob yo‘q
Gipermatn bu - ...(komp. tarmok.)	belgilangan joylarga o‘tish imkonini beruvchi strukturalashtirilgan matn	juda katta matn	kompyuterda terilgan matn	katta shrift qo‘llanilgan matn
Modem bu - ...(komp. tarmok.)	Texnik qurilma	Tarmoq protokoli	Internet serveri	Pochta programmasi
Qaysi protokol Internetda asosiy hisoblanadi (komp. tarmoq.)?	TCP/IP	HTML	TCP	HTTP
Internetga ulangan kompyuter albatta ... ga ega (komp. tarmoq).	IP adres	Web-server	shaxsiy Web-sahifa	domen nomi

Web-sahifadagi Гиперссылка ...ga utishga imkon beradi (komp. tarmok.)	Internet ixtiyoriy setveri Web-sahifasiga	faqat shu serverdagi Web-sahifaga	faqat shu mintaka Web-sahifasiga	faqat shu Web-sahifa ichida
Web-sapifalar quyidagi formatga ega?	htm	txt	doc	exe
Gipermatnli murojaatlar sifatida quyidagilarni ishlatish mumkin (komp. tarmok.)	so‘z, so‘zlar guruhi yoki rasmni,kursorni olib borilsa qo‘l rasmi hosil bo‘ladi	faqat rasmni	faqat videoni	faqat so‘zni
Web-sahifa bu.....	foydalanuvchi ma’lumotlari saqlanadigan hujjat	faqat tarmoq xaqida malumot saqlanadigan hujjat	faqat server axboroti saqlanadigan hujjat	dasturlar menyusi
HTML tili nima ?	Web-sahifa yaratish tili	dasturlash tili translyatori	Internet serveri	Web-sahifani ko‘rish uchun dastur
Modem bu-	axborotni telefon kanali orqali uzatishga mo‘ljallangan qurilma	axborotni saqlashga mo‘ljallangan qurilma	axborotni tezda qayta ishlashga mo‘ljallangan qurilma	axborotni chop etishga mo‘ljallangan qurilma
Brouzerlar qanday dastur?	Web sahifalarni ko‘rish dasturlari	virusga qarshi dasturlar	dasturlash tili translyatorlari	internet serveri
Manzillardan qaysi biri ikkinchi darajadagi domenga mos keladi ?	interweb.spb.ru	ww.fizika.ru	www.junior.ru/nikolaeva	www.junior.ru/nikolaeva//word.htm
Domen bu -...	tarmoqdagi foydalanuvchi kompyuteri adresini aniqlovchi manzilning bir qismi	kompyuterlarni bog’lovchi dastur nomi	axborotni o‘lchash birligi	kompyuterlarni bog’lovchi jihoz nomi
Internet tarmog’ida user_name@mtu-net.ru adres berilgan.Pochta saqlanadigan kompyuter nomini ko‘rsating	mtu-net	ru	mtu-net.ru	user_name
Internet tarmog’ida user_name@mtu-net.ru adres berilgan. Yuqori darajali domen nomini ko‘rsating.	ru	mtu-net.ru	mtu-net	user_name
C++ algoritmik tilni yaratgan inson?	Bern Straustrup	Niklaus Virt	Ken Tompson	Donald Knut
C++ dasturlash tilida bosh faylni yuklash uchun, masalan iostream, quyidagini yozish kerak:	#include <iostream>	#include <iostream#>	##include <iostream>	#include <#iostream>

C++ dasturlash tilida berilganlarni oddiy toifasi tog'ri yosilgan javobni ko'rsating:	butun – int, xaqiqiy – float yoki double, belgili – char	butun – int, xaqiqiy – float yoki real , belgili – char	butun – bool, xaqiqiy – float yoki d ouble, belgili – string	butun – int, xaqiqiy – float yoki d ouble, belgili – string
C++ dasturlash tilida qaysi kalit so'zi berilganlarni toifasiga kirmaydi?	real	float	double	int
C++ dasturlash tilida toifani to'gri yozilganini ko'rsating	int	init	ini	iit
C++ dasturlash tilida toifani to'gri yozilganini ko'rsating	double	doble	doube	dauble
C++ dasturlash tilida toifani to'gri yozilganini ko'rsating	float	floot	fooat	flaat
C++ dasturlash tilida toifani to'gri yozilganini ko'rsating	char	chur	chor	chir
C++ dasturlash tilida kiritish operatori to'g'ri yozilganini ko'rsating	cin	ciin	cen	cien
C++ dasturlash tilida chiqarish operatori to'g'ri yozilganini ko'rsating	cout	coot	cuut	caut
C++ dasturlash tilida operatorni to'g'ri yozilganini ko'rsating	endl;	end	end.	end,
C++ dasturlash tilida dastur asosiy qismi qaysi belgi bilan boshlanadi	{	}	(	)
C++ dasturlash tilida dastur asosiy qismini tugallash qaysi belgi bilan yoziladi	}	{	(	)
C++ dasturlash tilida to'g'ri yozilgan qatorni ko'rsating	cout << exp(param);	cout << exp(param):	cout << exp(param),	cout << exp(param).
C++ dasturlash tilida to'g'ri yozilgan qatorni ko'rsating	cout << sin(param * PI / 180);	cout << sin(param * PI / 180)	cout << sin(param * PI / 180),	cout << sin(param * PI / 180):
C++ dasturlash tilida to'g'ri yozilgan qatorni ko'rsating	{ cout << s << endl; }	{ cuut << s << endl; }	{ caut << s << end; }	{ cout << s << endl;
C++ dasturlash tilida to'g'ri yozilgan qatorni ko'rsating	system("PAUSE"); return 0;	system(PAUSE); return 0;	system("PAU SE"); return;	system("PAU SE"); retyrn 0;
C++ dasturlash tilida to'g'ri yozilgan qatorni	int main( )	int main{ }	int main[ ]	int main

ko‘rsating				
C++ dasturlash tilida to‘g’ri yozilgan qatorni ko‘rsating	#include <cmath>	#include <cmaath>	#include <cmatth>	#include <cmatuh>
C++ dasturlash tilida to‘g’ri yozilgan qatorni ko‘rsating	double param = 30.0;	doubble puram = 30.0;	doublle pyram = 30.0;	dauble param = 30.0;
C++ dasturlash tilida to‘g’ri yozilgan qatorni ko‘rsating	double a,f;	double a,f,	double a;f;	double a,f.
C++ dasturlash tilida quyidagi dastur lavhasi bajarilganda qanday javob hosil bo‘ladi: {double param = 30.0; cout <<sin(param * PI / 180); system("PAUSE"); return 0;}	0.5	1	2	4
C++ dasturlash tilida quyidagi dastur lavhasi bajarilganda qanday javob hosil bo‘ladi: { double param = 45.0; cout << sin(param * PI / 180); system("PAUSE"); return 0; }	0.7	0.8	0.9	1
C++ dasturlash tilida quyidagi dastur lavhasi bajarilganda qanday javob hosil bo‘ladi: {double param = 90.0; cout << sin(param * PI / 180); system("PAUSE"); return 0; }	1	0.5	0.7	-1
C++ dasturlash tilida quyidagi dastur lavhasi bajarilganda qanday javob hosil bo‘ladi: { double param = 0.0; cout << sin(param * PI / 180); system("PAUSE"); return 0; }	0	0.5	0.7	-1
C++ dasturlash tilida quyidagi dastur lavhasi bajarilganda qanday javob hosil bo‘ladi: double param = 0.0; cout << "Eksponenta soni " << param << " = " << exp(param);	1	2	2.8	-1

C++ dasturlash tilida quyidagi dastur lavhasi bajarilganda qanday javob hosil bo‘ladi: double param = 1.0; cout << "Eksponenta soni " << param << " = " << exp(param);	2.8	2	1	-1
C++ dasturlash tilida quyidagi dastur lavhasi bajarilganda qanday javob hosil bo‘ladi: double param = -1.0; cout << "Eksponenta soni " << param << " = " << exp(param);	1/2.8	2.8	-2.8	-1
Excelda "Мастер функций" qanday ishga tushiriladi?	f_x tugma yordamida	F9 tugma yordamida	F1 tugma yordamida	Ctrl tugmasi yordamida
Excelda c2:d3 oraliq qanday sohani bildiradi?	c2, c3, d2, d3 katakchalarni	a1, c3, d3 katakchalarni	c3, d2, d3 katakchalarni	c2, c3, d3 katakchalarni
Excelda katakchani faollashtirish uchun:	Shu katakcha ustida sichqon chap tugmasi bosiladi	Shu ustun nomida sichqon tugmasi bosiladi	F10 tugma bosiladi	F4 tugma bosiladi
Excelda c3:d4 oraliq qanday sohani bildiradi?	c3, c4, d3, d4 katakchalarni	c2, c3, d3 katakchalarni	c2, d3 katakchalarni	c2, c3, d2, d3 katakchalarni
Excelda son katakchaga to‘g’ri joylashtirilganligini qanday bilish mumkin?	Son katakchaning o‘ng chegarasiga yaqin	Matnga nisbatan son ochroq yoziladi	Son katakcha o‘rtasida yoziladi	Son katakchaning chap chegarasiga yaqin
Excelda katakchadagi ma’lumotni tahrirlash ishini yakunlash qaysi tugma yordamida bajariladi?	Enter	ESC	Backspace	Delete
Excelda Сервис menyusidagi Орфография (imlo xatoga tekshirish) buyrug’ini qaysi funksional tugma yordamida amalga oshirilishi mumkin	F7	F3	F5	F11

Excelda qo‘shni bo‘lgan bir nechta sohalarni ajratish uchun klaviaturaning qaysi yordamchi tugmasidan foydalaniladi?	Shift	Ctrl	ESC	Alt
Exceda menyu qatorini faollashtirish qaysi funksional tugma yordamida bajariladi?	F10	F5	F6	F9
Excelda "Открытие документа" muloqot darchasida bir nechta faylni tanlab belgilash uchun sichqoncha bilan birga qaysi tugmadan foydalanish mumkin?	Ctrl	ALT	Esc	End
Help (yordam) dan chiqish uchun qaysi tugma ishlatiladi?	Esc	Alt	Tab	F2
Excel nima?	elektron jadval	ma’lumotlar ombori	matn taxrirlagich	operasion sistema
Ma’lum bir vaqtdan so‘ng korzinadagilar birin-ketin …	To‘la o‘chiriladi	Qayta o‘qiladi	Taxlanadi	Tiklanadi
Qaysi tugmalar yordamida barcha fayllar belgilanadi?	Ctrl + A	Alt + O	Tab + Shift	Alt + A
Excelda aralash yoki absolyut murojaatlarda qanday belgi ishlatiladi?	$	*	@	"
Matritsalarni o‘zaro ko‘paytirish uchun Master funksiyning qaysi kategoriyasidan foydalaniladi (Excel)?	Математические	Текстовые	Логические	Финансовые
Matritsalarni o‘zaro ko‘paytirish uchun Master funksiyning qaysi funksiyasi ishlatiladi (Excel)?	МУМНОЖ	МОБР	МОПРЕД	ТРАНСП
Matritsalarni o‘zaro ko‘paytirishda natija hosil qilish uchun qaysi tugmalar majmui bosilad (Excel)?	Ctrl+Shift+Enter	Alt+Shift+Enter	Shift+Enter	Alt+Enter

Matritsalarni transponerlashda master funksiyaninig qaysi kategoriyasidan foydalaniladi (Excel)?	Ссылки и массивы	Математические	Текстовые	Логические
Matritsalarni transponerlash uchun Master funksiyaninig qaysi funksiyasi ishlatiladi (Excel)?	ТРАНСП	МУМНОЖ	МОБР	МОПРЕД
Kompyuterlarning asosiy qurilmalari to‘g’ri keltirilgan qatorni ko‘rsating?	sistemali blok, monitor, klaviatura	printer, skaner, plotter, modem	printer, monitor, klaviatura, sichqoncha	skaner, printer, sistemali blok, sichqoncha
Printer nima?	kompyuterdagi ma’lumotlarni qog’ozga chiqaruvchi qurilma.	matnli yoki grafikli ko‘rinishdagi ma’lumotlarni ekranga chiqaruvchi qurilma.	kompyuterga belgilarni kiritishni ta’minlovchi qurilma.	kompyuterning «miya»si.
Excelda A1 va A2 katakchalarga mos ravishda 2 va 5 sonlar kiritilgan. A1 katakchani aktivlashtirib A3,A4 va A5 katakchalarga nusxalansa, ularda qanday ma’lumot hosil bo‘ladi?	2,2,2	5,5,5	2,5,8	5,8,11
Excelda A1 va A2 katakchalarga mos ravishda 2 va 5 sonlar kiritilgan. A2 katakchani aktivlashtirib A3,A4 va A5 katakchalarga nusxalansa, ularda qanday ma’lumot hosil bo‘ladi?	5,5,5	2,2,2	2,5,8	8,11,14
Excelda A1 va A2 katakchalarga mos ravishda 4 va 5 sonlar kiritilgan. A1 katakchani aktivlashtirib A3,A4 va A5 katakchalarga nusxalansa, ularda qanday ma’lumot hosil bo‘ladi?	4,4,4	5,5,5	2,5,8	5,8,11
Excelda nusxalash klaviaturadagi qaysi tugmalar yordamida bajariladi?	Ctrl C so‘ng Ctrl V	Ctrl A so‘ng Ctrl V	ALT+f7 so‘ng Ctrl C	Ctrl X so‘ng Ctrl V

Excelda E va F ustunlari orasiga yangi ustun qo‘shish uchun qaysi ustunlar belgilanadi?	F	E va F	E	H
Excelda arifmetik amallar ketma-ketligi qanday?	1) darajaga oshirish 2) *va / 3) + va -	1) + va - 2) *va / 3)darajaga oshirish	1) / 2) + va - 3)darajaga oshirish	1) darajaga oshirish 2) + va - 3) *va /
Excelda C va D ustunlari orasiga yangi ustun qo‘shish uchun qaysi ustunlar belgilanadi?	D	C va D	D eki E	H
Excel elektron jadval dasturida necha dona ustun va qator bor?	256 ta ustun va 65536 ta qator	256 ta ustun va 256 ta qator	256 ta ustun va 99999 ta qator	26 ta ustun va 256 ta qator
Excel da (n,m) o‘lchamli matritsani transponerlashda qanday soha ajratiladi?	(m,n)	(n,n)	(n,n)x(n,n)	(n,m)
Excelda ENTER tugmasi nima uchun xizmat qiladi?	Malumotni katakchaga kiritish uchun	Kursorni mos ravishda satr boshiga va oxiriga surish uchun	Dasturlashdan voz kechish tugmasi	Kursorni mos ravishda sahifa boshiga va oxiriga keltiradi
Excelda berilganlarni saralash qanday bajariladi?	Данные / Сортировка	Правка / Сортировка	Сервис / Сортировка	Вставка / Сортировка
Hujjatni saqlash muloqot darchasida nimalar kiritiladi (kursatiladi)?	Nomi, tipi, o‘rni	Tipi,o‘rni	Nomi,tipi	O‘rni
Excel Windows uchun nima?	Ilova dastur	Yordamchi dastur	Boshkaruvchi dastur	Alokasi yuk dastur
MS Excel da A1 dan A10 kataklarning yig`indisini topish formulasi	=summ(A1:A10)	=summ(A1;A10)	=summa(A1:A10)	=A1+...+A10
Mathcad 15 qanday tizim?	Barcha javoblar tugri.	Mathcad matematik hisoblarni avtomatlashtirish tizimlaridan biridir.	Mathcad universal integrallashgan kompyuterda modellash tizimidir.	Mathcad ilmiy-texnikaviy hisoblashlar uchun eng mukammal dasturlash tizimidir.
Arifmetik operatorlar nima uchun qo‘llaniladi?(Mathcad15)	arifmetik ifodalarni shakllantirish va ularni hisoblash uchun.	sonli operandlarni qiyoslash uchun	mantiqiy ifodani hosil qilish uchun.	jadvallarni yaratish uchun.
Munosabat farmoyishlari nima uchun ishlatiladi? (Mathcad 15)	sonli operandlarni qiyoslash uchun	arifmetik ifodalarni shakllantirish	mantiqiy ifodani hosil qilish uchun.	jadvallarni yaratish uchun.

		va ularni hisoblash uchun.		
Mantiqiy farmoyishlar nima uchun ishlatiladi. (Mathcad 15)	mantiqiy ifodani hosil qilish uchun.	arifmetik ifodalarni shakllantirish va ularni hisoblash uchun.	sonli operandlarni qiyoslash uchun.	jadvallarni yaratish uchun.
Mathcad 15 dasturi instrumentlar paneli necha bo‘limlan iborat:	17	16	15	14
Mathcad 15 dasturi menyu katori necha ustundan iborat:	9	8	7	6
Mathcad 15dasturida yangi xujjat yaratish qaysi funktsional tugmalar yordamida bajariladi:	Ctrl+N	Ctrl+O	Ctrl+W	Ctrl+P
Mathcad 15 dasturida xujjatni xotiraga saqlash qanday amalga oshriladi:	Ctrl+S	Ctrl+O	Ctrl+H	Ctrl+P
Mathcad15 dasturida matritsa darchasi qanday ishga tushiriladi:	Ctrl+M	Ctrl+O	Ctrl+H	Ctrl+P
Mathcad15 dasturida funktsiya bo‘limi qanday ishga tushiriladi:	Ctrl+E	Ctrl+O	Ctrl+H	Ctrl+P
 Qanday panel? (Mathcad 15)	Mathcad - xujjatda turli xil grafiklarni kurish imkoniyatini beruvchi to‘qqista buyruqlarni o‘z ichiga olgan panel hosil qilinadi.	dekart koordinatalar sistemasida ikki o‘lchovli grafiklar kurish paneli	dekart koordinatalar sistemasida grafiklarni masshtabini o‘zgartirish paneli	dekart koordinatalar sistemasida nuqtaning koordinatalarini aniqlash paneli
 nimani bajaradi? (Mathcad15)	dekart koordinatalar sistemasida ikki o‘lchovli grafiklar qurish;	dekart koordinatalar sistemasida grafiklarni masshtabini o‘zgartirish;	dekart koordinatalar sistemasida nuqtaning koordinatalarini aniqlash;	qutb koordinatalar sistemasida grafiklar qurish;
 qanday buyruq? (Mathcad15)	dekart koordinatalar sistemasida grafiklarni masshtabini o‘zgartirish;	dekart koordinatalar sistemasida nuktaning koordinatalarini aniqlash;	kutb koordinatalar sistemasida grafiklar qurish;	dekart koordinatalar sistemasida uch ulchovli grafik qurish;
 kanday buyruk? (Mathcad 15)	dekart koordinatalar sistemasida	qutb koordinatalar sistemasida	dekart koordinatalar sistemasida	sath, chiziqlarini chizish;

	nuqtaning koordinatalarini aniqlash;	grafiklar qurish;	uch o‘lchovli grafik qurish;	
 qanday vazifani bajaradi? (Mathcad 15)	qutb koordinatalar sistemasida grafiklar qurish;	dekart koordinatalar sistemasida uch o‘lchovli grafik qurish;	satx, chiziqlarini chizish;	uch o‘lchovli gistogramma qurish;
 kanday buyruk? (Mathcad 15)	dekart koordinatalar sistemasida uch o‘lchovli grafik qurish;	sath chiziqlarini chizish;	uch o‘lchovli gistogramma ko‘rish;	uch o‘lchovli nuqtali diagramma yasash;
 qanday vazifaga ega? (Mathcad 15)	satx, chiziqlarini chizish;	uch o‘lchovli gistogramma qurish;	uch o‘lchovli nuqtali diagramma yasash;	vektor maydonini hosil qilish.
 qanday vazifaga ega? (Mathcad 15)	uch o‘lchovli gistogramma qurish;	uch o‘lchovli nuqtali diagramma yasash;	vektor maydonini hosil qilish.	satx chiziqlarini chizish;
 qanday vazifaga ega? (Mathcad 15)	uch o‘lchovli nuqtali diagramma yasash;	satx chiziqlarini chizish;	uch o‘lchovli gistogramma qurish;	vektor maydonini hosil qilish.
 qanday vazifani bajaradi? (Mathcad 15)	vektor maydonini hosil qilish.	satx chiziqlarini chizish;	uch o‘lchovli gistogramma qurish;	uch o‘lchovli nuqtali diagramma yasash;
Global tarmoq deb nimaga aytiladi (komp. tarmoq.)?	turli shaxar va mamlakatlardagi kompyuterlar bog’lanishi	bir nechta lokal tarmoqlarning bog’lanishi	biror inshoatning turli qavatlarida joylashgan kompyuterlar bog’lanishi	bir nechta kompyuterlar va printerning bog’lanishi
Lokal tarmoq topologiyasi deb nimaga aytiladi (komp. tarmoq.)?	SHK va boshqa qurilmalarning bog’lanish usullari	kompyuterlarning xonada joylashishi	lokal tarmoq konfiguratsiyasi	to‘g’ri javob yo‘q
Kompyuter telekommunikatsion tarmoqqa ulanishi uchun nima kerak?	modem	printer	telefon apparati	skaner
Elektron pochta (email) ... uzatishga imkon beradi (komp. tarmoq.)	malumotlar va unga biriktirilgan fayllarni	faqat malumotlarni	faqat fayllarni	faqat video tasvirlarni
Sputnik orqali Internetga ulanish uchun qanday qurilma zarur?	oddiy rakamli TV-tyuneri	DVB- karta	Router	HUB
Internet tarmog’ida Abdukadirova@mail.ru pochta adresida elektron	Abdukadirova	@	ru	Abdu

adres egasining nomini ko‘rsating				
Veb-kamera bu - ...(komp. tarmoq.)	texnik qo‘rilma	tarmoq protokoli	Internet serveri	pochta programmasi
Qaysi protokol Internetda asosiy xisoblanadi (komp. tarmoq.)?	TCP/IP	HTML	TCP	HTTP
Internetga ulangan kompyuter albatta ... ga ega (komp. tarmoq.).	IP adres	Web-server	shaxsiy Web-sahifa	domen nom
Web-sahifadagi Giperssilka ...ga utishga imkon beradi (komp. tarmoq.)	Internet ixtiyoriy setveri Web-sahifasiga	fakat shu serverdagi Web-sahifaga	fakat shu mintaka Web-sahifasiga	fakat shu Web-sahifa ichida
Web-sahifalar quyidagi formatga (kengaytmaga) ega (komp. tarmoq.)	htm	txt	doc	exe
Gipermatnli murojaatlar sifatida quyidagilarni ishlatish mumkin (komp. tarmoq.)	so‘z,so‘zlar guruxi eki rasmni,ko‘rsorni olib borilsa kul rasmi xosil bo‘ladi	faqat rasmni	ixtiyoriy so‘z va rasmni	fakat so‘zni
Web-sahifa bu-...(komp. tarmoq.)	foydalanuvchi axboroti saqlanadigan xujjat	fakat tarmoq xaqida malumot saklanadigan xujjat	fakat server axboroti saklanadigan xujjat	dasturlar menyusi
To‘g’ri yozilgan qatorni ko‘rsating	cout << tan(param * PI / 30);	cout << tan(param * PI / 30)	cout << tan(param * PI / 30),	cout << tan(param * PI / 30):
MS Excel da B1 dan B15 kataklarning yig’indisini topish formulasi	=summ(B1:B15)	=summ(B1;B15)	=summa(B1:B15)	=sum(B1+...+B15)

V. GLOSSARIY

Ingliz tilida	O‘zbek tilida	Ingliz tilida	O‘zbek tilida
Smart Filter	Auto Filtr	A data selection, displayed in the field (column). When auto filters are included in the header of each column in the table shows the arrow AutoFilter menu disclosure. In this menu, you can select the data to be displayed in the field. Filter selection does not delete the information from the project, only selected data in the view.	Dala (ustun) ko‘rsatiladi A ma'lumotlar tanlash. Auto filtrlar jadvalda har bir ustun boshi kiritilgan bo‘lsa arrow Avtomatik menyu oshkor ko‘rsatadi. Ushbu menyuda Siz ma'lumotlar sohasida ko‘rsatiladi uchun tanlashingiz mumkin. Filter tanlash loyihasi, ko‘rinishida faqat tanlangan ma'lumotlarni ma'lumot yo‘q qilmaydi.
Administrator	Administrator	The person responsible for setting up and managing user accounts, assigning permissions and user access to the network and server. This person can also configure and manage the various elements in the versions of Microsoft Project Professional and Microsoft Project Server.	Tashkil etish va foydalanuvchi hisob boshqarish, tarmoq va serverga ruxsat va foydalanuvchi uchun ruxsatdan tayinlash uchun javobgar shaxs. Bu shaxs, shuningdek, sozlash va Microsoft Project Kasb-Microsoft Project Server versiyalarida turli unsurlarni boshqarishingiz mumkin.
Baseline	Basseline	Set the copied data on the project, containing information on the main parameters of the time and cost of works; needed for comparison characteristics of the project at different stages of its life cycle.	Vaqt va ishlar qiymati asosiy parametrlari to‘g'risidagi ma'lumotlarni o‘z ichiga olgan, loyiha ustida nusxa ko‘chirish, ma'lumotlarni o‘rnating; uning hayot tsiklining turli bosqichlarida loyiha taqqoslash xususiyatlari uchun zarur.
Document library	Kutub xona hujjati	The folder that contains a set of common files, which often use the same template. Each file in the library defined by the user communicate information that can be viewed in the library content list.	Ko‘pincha bir xil andozani foydalanish umumiy fayllar, bir qator o‘z ichiga oladi papkani. Foydalanuvchining belgilangan kutubxonasida har bir fayl kutubxona kontent ro‘yxatda ko‘rish mumkin ma'lumotlarni muloqot.
Milestone	Milestone	1. The reference point, which marks an important event in a	Bir loyihada muhim voqea to‘ldi va project.2 etuk tomosha qilish uchun

		project and used to monitor the progress of the project.2. Work with zero duration - it should be marked as the start or end mark.	ishlatiladi 1. mos yozuvlar nuqtasi. Nol davomiyligi bilan ishlash - bu boshlang'ich yoki oxirgi belgisi sifatida belgilangan bo‘lishi kerak.
Nonworking time	Ishchi vaqtdan tashqari	Hours or days in the calendar of a resource or project for which Microsoft Project may not schedule tasks because the work is not performed. In non-project time includes lunch breaks, weekends and holidays.	Ish amalga emas, chunki Microsoft Project vazifalarni Xronologiya mumkin emas, buning uchun bir manba yoki loyiha taqvimiga soat yoki kun. Non-loyiha vaqt tushlik tanaffus, dam olish kunlari va bayram o‘z ichiga oladi.
External dependency	Tashqi bog'liqlik	Dependencies between tasks in different plans to Microsoft Project. These external dependencies are usually displayed as a low-contrast. To enable external dependencies there is no need to consolidate projects or establish sub-project communication.	Microsoft Project uchun turli rejalar vazifalar orasidagi bog'liqliklar. Bu tashqi bog'liqliklar odatda past-farqli sifatida aks etadi. Tashqi bog'liqliklar loyihalarni birlashtirish yoki sub-loyiha muloqot qilish hojat yo‘q qilinadi faollashtirish uchun.
Resource Allocation	Resurs Allokation	Ma'lum bir maqsad uchun ajratilgan resurs salohiyatini foiz.	The percentage of resource capacity allocated for a specific purpose.
Levelling	Rag'batlantirish	Cheklangan resurslardan ko‘rinishida loyiha ijrosini rejalashtirish.	Scheduling the project execution in view of the limited resources.
Group	Guruh	Shu ruxsat berildi individual foydalanuvchilar majmui.	A set of individual users who have been granted the same permissions.
Gantt Chart	Gantt Chart	Ishlari gorizontal vaqt shkalasi bo‘yicha joylashtirilgan to‘g'ri chiziq qismlarini shaklida ko‘rsatiladi qaysi berish. MS Project Gantt grafigi diagrammasi, stol sohasida to‘g'ridan-to‘g'ri topgan murakkab vakillik hisoblanadi.	Submission, in which works are displayed in the form of straight line segments placed on a horizontal time scale. The MS Project Gantt chart is a complex representation, which consists directly from the diagram, the area of the table.

Availability	Imkoniyat	Biron-bir vaqt oralig'i uchun resurslar mavjud miqdori	Available amount of resources for a predetermined time interval
Task	Masala	Tafsilotlarigacha faoliyatini ishlatiladi kichik mustaqil birligi loyiha mantiq maqsadga va tavsifi erishish uchun. Umuman, ish quyidagi xususiyatlari bilan xarakterlanadi mumkin: · Har bir vazifa aniq boshlanish va oxiri bor. · Loyiha maqsadlaridan o‘rtasidagi mantiqiy ishoratlar bor. · Odamlar, materiallar va moliya bir manba sifatida foydalanish vazifalari. Ular narxini bor	The smallest independent unit that is used to detail the activities to achieve the objective and description of the project logic. In general, the work can be characterized by the following features: · Each task has a definite beginning and end. · There are logical links between the objectives of the project. · Tasks used as a resource of people, materials and finance. · They have a cost
As Late As Possible	Iloji boricha kech	MS Project Biroq, qochish, eng so‘nggi davrlar bo‘yicha joylashganki ish, ergashsa erta Xurmo kechikishlar.	The work that MS Project is positioned on the most recent periods, avoiding, however, the delays in the early dates of the follower.
As Soon As Possible	Imkoni boricha tezda	Ish uchun MS Project erta joiz vaqt erta sana belgilab beradi. Tizimida ish ko‘rsatuv turi.	The work for which MS Project sets the early date of the earliest permissible time. The default type of work in the system.
Calendar	Kalendar	Loyihada manba uchun ish vaqti Tavsif	Description of working time for the resource in the project
Resource calendar	Resurs taqvim	Bir manbai mehnat va ish bo‘lmagan vaqt bildirgan taqvim. resurs kalendar ko‘proq resurslarni mehnat va ish bo‘lmagan vaqt ko‘rsatuvchi asosiy Taqvimdan farq qiladi. Foydalanuvchi bunday bayramlar, hafta ichi yoki turli smenada sifatida individual istisno uchun noyob resurs aniqlash uchun bir manba taqvim murojaat qilishingiz mumkin.	Calendar that specifies working and nonworking time for an individual resource. resource calendar differs from a base calendar that specifies working and nonworking time for more resources. The user can apply a resource calendars to determine the unique resource for individual exceptions, such as holidays, weekdays or different shifts.

Category	Kategoriya	Oila loyihalar va / yoki resurslar, ruxsat berilgan foydalanuvchi yoki guruh ko‘rish uchun.	Family projects and / or resources, permission to view that given user or group.
Outline code	Outline kodi	Vazifalar yoki resurslar uchun belgilangan va loyihada vazifalar ierarxiyasini ko‘rsatish uchun imkon etiladi WBS kodlari yoki tuzilmalar raqamlar boshqa Tags.	Tags other than WBS codes or numbers of structures that are defined for tasks or resources and allow you to display the hierarchy of tasks in the project.
Finish-to-Finish		Ish-tergovchining oqibati salafiy ish oxirida bog'liq ekanini ko‘rsatadigan ish orasidagi munosabatlar,	The relationship between work, showing that the end of the work-investigator depends on the end of the work of the predecessor
Finish-to-Start	Maradan maragacha	Ergashsa boshlanishi salafiy oxirida oldingi bo‘lishi mumkin emas, deb ko‘rsatib ish orasidagi munosabatlar. Ko‘p hollarda, bu ketma-ketligi old qadar oxirigacha etolmayman, degan ma'noni anglatadi. Default ishga o‘rtasida Ushbu bog'	The relationship between work, showing that the beginning of the follower can not be earlier than the end of the predecessor. In most cases, this means that the sequence can not begin until the end until the precursor. This link between the default operation
resource effort ratio	Resurs harakat nisbati	Microsoft Project resurslarni yuklash va bir xil hajmining ish davomida hisob farqlar hisobga olish imkonini beradi 2002 variant. Misol uchun. Shu uchun yoki 16 soat davomida, ammo yarim yuk 8 soat - zamin ekskavator 2, 2000 kub metr ekskavatör 4 16 soat davomida olib tashlandi, va	Microsoft Project 2002 option, which allows to take into account differences in the loading of resources and in the duration of the work of the same volume. For example. 2000 cubic meters of ground excavator 2 is removed for 16 hours, and the excavator 4 - 8 hours for the same or for 16 hours but at half load
Critical Task	Tanqidiy Vazifa	Nol yoki salbiy zaxirasini ega bo‘lsa ish muhim hisoblanadi.	The work is considered critical if has a zero or negative reserve.
Assignment	Vazifa	Uchun alohida vazifa tayinlangan maxsus bir manba.	A specific resource that is assigned a specific task.

Schedule Variance (SV)	Jadvali Burilish (SV)	Ish rejalangan iqtisodiy o‘rtasidagi farq amalga va rejalashtirilgan ishlar rejalashtirilgan qiymati.	The difference between the planned cost of work performed and the planned cost of the planned works.
Cost Variance (CV)	Xarajati Burilish (CV)	Ish rejalashtirilgan va haqiqiy qiymati o‘rtasidagi farq amalga.	The difference between planned and actual cost of work performed.
Gantt bar	Gantt bar	Ishni bajarish muddatini ko‘rsatgan Gantt Chart ko‘rinishida diagrammasi element grafik.	The graphic in the diagram element in the Gantt Chart view, showing the duration of the task.
Baseline Cost of Work Performed (BCWP)	Bajarilgan ish asosiy iqtisodiy (BCWP)	Pul jihatidan taraqqiyot o‘lchash imkonini beradi iqtisodiy tahlil ishlatiladigan parametrlar. Bundan tashqari, u "sanada dolzarb ishlab chiqarish." deb nomlangan	Parameters used in the cost analysis which allows to quantify progress in terms of money. also it called "the actual production on the date."
Baseline Cost of Work Scheduled (BCWS)	Rejali ish asosiy iqtisodiy (BCWS)	Rejalashtirilgan iqtisodiy original loyiha rejasiga muvofiq mavjud raqamiga qilinishi kerak edi tamom ulushi bilan ko‘paytiriladi.	Planned cost is multiplied by the percentage of completion that had to be made to the current number according to the original project plan.
Timephased	Vaqt bosqichda	Vazifalar, resurslar, yoki maqsad axborot vaqtida tarqatildi.	Tasks, resources, or destination information distributed in time.
Subtask	Vazifani	A Xulosa vazifa qismi bo‘lgan muammo. Axborot sub Xulosa vazifa konsolide etiladi.	The problem, which is part of a summary task. The information is consolidated in the sub summary task.
Late Dates	Kech Xurmo	Qaytish path Vaqt tahlil qilish hisoblab. Kech xurmo kech boshlash va ish oxirida tomonidan ko‘rib chiqiladi.	Computed on the return path timing analysis. Late dates are considered by the late start and end of work.
Field	dala	Vazifa, manba va belgilash haqida aniq ma'lumotlarni o‘z ichiga olgan bir lavha Manzil.	Location in a sheet containing specific information about a task, resource or assignment.

Portfolio	Portfolio	Tashkilot loyihalarini, ro‘yxati mumkin qo‘shma boshqarish qamrov zonasi, byudjet yoki resurslar uchun.	List of projects of the organization, for which possible joint management coverage area, budget or resources.
Successor	voris	Ish mantiqiy joriy ish quyidagicha. Muddatli zudlik alomat bevosita ko‘rsatilgan sana, odatda, degan ma'noni anglatadi.	Work logically follows the current work. The term means generally the immediate precursor directly specified dates.
Overallocation	xos ortiq	U mavjud ish vaqtida amalga oshirish mumkin ko‘ra resurs ko‘proq vazifalarni tayinlangan vaziyat.	A situation where the resource is assigned more tasks than he can accomplish in the working time available.
Views	Ko‘rishlar	Microsoft Project Server loyihalar va resurslarni ro‘yxati yoki hisobot. Vakolatxonalari ko‘rishingiz va loyihalar, vazifalar va resurslar bo‘yicha ma'lumotlarni tahlil qilish imkonini beradi. Server administratori tomonidan tashkil etilgan vakolatxonalari turlari qarab, ko‘rgan va foydalanish mumkin qarashlari, shuningdek, mavjud foydalanuvchi ruxsatini o‘z ma'lumotlarini ko‘rish uchun.	List or report on projects and resources on the Microsoft Project Server. Representations allow you to display and analyze data on projects, tasks and resources. The views that can be seen and used, depending on the types of representations established by the server administrator, as well as the existing user permissions to view its data.
Predecessor	o‘tmishdosh	Ish mantiqiy boshqa oldin. Bu termin bilan, odatda, bevosita o‘zidan avvalgi mo‘ljallangan.	Work logically precedes the other. By this term is usually meant immediate predecessor.
Priority	ustuvor	Qoida resurs rejalashtirish bilan rejalashtirish ish tartibini aniqlash uchun ishlatiladi.	The rule used to determine the order of work planning with resource planning.
Authentication	Haqiqiylikni tekshirish	Muayyan foydalanuvchi aniqlash va Microsoft Project Server serverga murojaat kirish uchun uning ruxsatisiz mavjudligini tasdiqlash jarayoni.	The process of identifying a particular user and confirm the presence of his permission to access the Microsoft Project Server server.

Project	loyiha	Tartibda kelishilgan harakatlar majmui ma'lum bir maqsadga erishish uchun. Bundan tashqari, ma'lumotlar majmui bu maqsadga erishish bilan bog'liq. Tor ma'noda, ish tarmog'i, yoki berilgan tarmog'ini o‘z ichiga olgan faylga.	A set of coordinated action in order to achieve a certain goal. Also, the data set related to achieving this goal. In a narrow sense, work network, or a file containing a given network.
% Complete	% Complete	MS loyihasi ishlatiladigan ish tugaganidan bir chorasi amalga oshirilgan ishlar qolgan qismi davomiyligini hisoblash uchun.	A measure of completion of work used in MS Project to calculate the duration of the remaining part of the work performed.
Resource pool	Resurs hovuz	Loyiha maqsadlari maqsadida mavjud resurslarni majmui. Resurs hovuz bir loyihada faqat ishlatiladigan va bir necha loyihalari bilan birgalikda mumkin.	A set of resources available for the purpose of the project objectives. The resource pool can be used exclusively in one project, and shared across multiple projects.
Task	masala	Tafsilotlarigacha faoliyatini ishlatiladi kichik mustaqil birligi loyiha mantiq maqsadga va tavsifi erishish uchun. Umuman, ish quyidagi xususiyatlari bilan xarakterlanadi mumkin: · Har bir ish aniq boshlanish va oxiri bor. · Loyihada ishlarning o‘rtasida mantiqiy aloqa mavjud. · Ishlari, odamlar, materiallar va moliya bir manba sifatida ishlatiladi. · Ular narxini bor.	The smallest independent unit that is used to detail the activities to achieve the objective and description of the project logic. In general, the work can be characterized by the following features: · Each work has a definite beginning and end. · There are logical connections between the works in the project. · Works is used as a resource of people, materials and finance. · They have a cost.
Working time	Ish Vaqti	Soat bo‘lgan ish loyiha taqvim yoki bir manbaga ko‘ra amalga oshirilishi mumkin.	Hours in which work can be carried out according to the project calendar or a resource.
Early Dates	erta Xurmo	Ish boshlash yoki imkon qadar erta munosabati da nihoyasiga mumkin sana to‘g'ridan-to‘g'ri o‘tish hisoblab.	Calculated in the direct passage of the date when the work can begin or end at the earliest possible occasion.

Schedule	jadvali	Microsoft Project Web Access komponent resurslari vazifalarni o‘z ishtirokini ro‘yxatga olish va loyiha menejeri xabarnoma yuborish mumkin jadvali sahifa hisoblanadi.	In Microsoft Project Web Access component is a schedule page, where resources can register their participation in the tasks and send the notification to the project manager.
Slack	bo‘shashmasdan	Ish loyihada boshqa ishlarni tanlashga ta'sir holda jo‘natilmasligi mumkin ish vaqti miqdori.	The amount of working time that the work can be delayed without affecting the choice of other works in the project.
Resources	resurslar	Rassomlar, uskunal ar va loyiha vazifalarni bajarish uchun foydalaniladigan materiallar.	Artists, equipment and materials used to complete tasks in a project.
Portfolio view (Chart)	Portfolio view (Grafik)	Interaktiv jadvali Microsoft Project Server ma'lumotlarni grafik tahlil beradi. Foydalanuvchilar ko‘rsatish va maydon va ma'lumotlar sudrab ma'lumotlarni tashkil mumkin. Siz, batafsil turli darajalarda ma'lumotlarni ko‘rish maydon va ma'lumotlar, shuningdek, namoyish sudrab grafik tartibini o‘zgartirish va tegishli sohalarda uchun tomchi-pastga ro‘yxatini foydalanib ma'lumotlar yashirish mumkin.	Interactive chart provides the graphical analysis of the data from Microsoft Project Server. Users can display and organize data by dragging the fields and items. You can view the data with varying levels of detail, change the chart layout by dragging fields and items, as well as show and hide items by using drop-down lists for the appropriate fields.
PivotTable	markaz jadval	Umumlashtirilishi va Microsoft Project Server serverdan ma'lumotlarni tahlil interaktiv stol. Foydalanuvchilar ko‘rsatish va maydon va ma'lumotlar sudrab ma'lumotlarni tashkil mumkin.	An interactive table that summarized and analyzed data from Microsoft Project Server server. Users can display and organize data by dragging the fields and items.
Lag	Lag	Loyihada aloqa uchun vaqt uzilish. Shift ijobiy yoki salbiy bo‘lishi mumkin. Shunga ko‘ra, u bir kechikish yoki	The time delay for the communication in the project. The shift can be positive or negative. Accordingly, it is called a delay or advance.

		oldindan deyiladi.	
PERT Chart	PERT Chart	Loyihasining taqdimoti bo‘lgan loyiha mantiq asarlar joylashtirish hal qiluvchi omil hisoblanadi. Shuningdek PERT-diagrammasi, mantiq diagrammasi deb ataladi.	Presentation of the project in which the project logic is the determining factor in the placement of works. Also called PERT-diagram, logic diagram.
To-do list	Vazifalar ro‘yxati	Vazifalar ro‘yxati emas loyiha jadvaliga bog'liq.	The list of tasks not related to the project schedule.
Earned Value Analysis	Kazanılmış qiymat tahlil	Yondashuv pul jihatidan umumiy taraqqiyot baholaydi loyihasi, xarajatlarini nazorat qilish. Haqiqiy ishlab chiqarish rejalangan iqtisodiy, jismoniy tamom foizini urilib hisoblanadi. Haqiqiy ishlab chiqarish uchun yana bir muddat - ish rejalangan iqtisodiy ijro etdi.	The approach to control costs in the project, which evaluates overall progress in terms of money. Actual production is calculated by multiplying the percentage of completion of the physical on the planned cost. Another term for the actual production - planned cost of work performed.
Work breakdown structure (WBS)	Ish yo borini tuzilishi (WBS)	Tashkiliy ierarxiyasi tasvirlab tuzilishi. RBS kodi tashkilotning ierarxik bir manba o‘rnini belgilaydi.	The structure describing the organizational hierarchy. RBS code defines the position of a resource in the hierarchy of the organization.
Work	Ish	Jami kishi-soat barcha resurslarni vazifani bajarish uchun zarur.	Total required to complete the task of all the resources in man-hours.
Outline level	tuzilma darajasi	Yuqori darajadagi darajali vazifalar berilgan birikib soni.	The number of depressions given level tasks from the upper level.
GIF-file	GIF-fayl	Brauzerda ko‘rsatilishi mumkin siqish bilan grafik fayllar, formati. GIF formati keng internet orqali tasvir o‘tkazish uchun ishlatiladi.	The format of graphic files with compression, which can be displayed in the browser. GIF format is widely used to transfer images over the Internet.
Actual Cost of Work Performed (ACWP)	Bajarilgan ish Actual XARAJATLAR (BCWP)	Haqiqiy ish xarajatlar, loyiha, butun loyihaning bir qismi.	The actual job costs, part of the project, the whole project.
Actual work	haqiqiy ish	Vazifa yoki lavozimga tayinlangani bilan qilgan vaqt birligida o‘lchanadi	The work volume, measured in units of time made by the task or appointment. For example,

		ish hajmi. - Dolzarb Ish Qolgan Ish = harakat: Foydalanuvchi vazifa haqida dolzarb ishlar kiradi Masalan, Microsoft Project formula qolgan ish hisoblangan. muddatli tez-tez "aslida" haqiqiy ish uchun ishlatiladi.	when the user enters the actual work on the task, Microsoft Project calculates the remaining work on the formula: Remaining Work = Effort - Actual Work. The term is often used for actual work "in fact".
Filter	filter	Ko‘rsatilgan yoki ko‘rinishida chiqadi vazifalar yoki resurslar haqida ma'lumotlar ko‘rsatilgan 1. vositalari. 2. ko‘rinishida ish yoki resurslarni tanlash mezoni. Filtri yoki yozuv maydon belgilangan talabni, yoki maxsus rang diqqatga sazovor qondiradi ko‘rish uchun taqdimot paydo yozuvlar turlarini cheklash "mos" ish	1. Means specifying information about the tasks or resources that are displayed or stand out in the view. 2. The criterion of selection of work or resources in the view. The filter or limit the range of records that appear in the presentation to see if the recording field satisfies a specified condition or a special color highlights "suitable" work
Security Template	Xavfsizlik Andoza	Ruxsatnomalar A oldindan belgilangan majmui.	A predefined set of permissions.

VI. ADABIYOTLAR

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