

**O'zbekiston Respublikasi Oliy va o'rta maxsus ta'lim vazirligi**

**Alisher Navoiy nomidagi Samarqand Davlat universiteti**

**Aminov I.B., Eshtemirov S.**

**«Amaliy dasturlar majmuasi» fanidan mustaqil  
mashg'ulot topshriqlari**

**Uslubiy qo'llanma**

**Samarqand-2014**



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**Axborotlashtirish texnologiyalari kafedrası**

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*( matematika ta'lim yo'nalishida bilim olayotgan 2-kurs talabalari uchun)*

**Uslubiy qo'llanma**

**Samarqand-2012**

Aminov.I.B. «Amaliy dasturlar majmuasi» fanidan mustaqil mashg'ulot topshriqlari . Uslubiy qo'llanma.-SamDU, Samarqand, 2014 yil., 28 bet .

*Uslubiy qo'llanma matematika yo'nalishida ta'lim olayotgan 2-kurs talabalar uchun mo'ljallangan bo'lib, unda ularni "Amaliy dasturlar majmuasi" fani dan mustaqil ishlarini bajarish bo'yicha uslubiy ko'rsatmalar berilgan.*

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## Soʻz boshi

Zamonaviy kompyuterlarda laboratoriya ishi va mustaqil mashgʻulotlarini bajarish, talabalarning «Amaliy dasturlar majmuasi» fanini mukammal oʻrganishlarida muhim rol oʻynaydi. Ikkinchi tomondan, ularning kompyuter bilan ishlash bilim va koʻnikmalarini shakllantirishda amaliy va mustaqil mashgʻulotlari katta ahamiyatga ega.

Amaliy mashgʻulot 3 ta mavzu boʻyicha mashgʻulot topshiriqlardan iborat.

Har bir amaliy mashgʻulot topshiriqlari quyidagi bosqichlar orqali amalga oshiriladi:

1. *Amaliy mashgʻulot mavzusi.*
2. *Amaliy mashgʻulot maqsadi.*
3. *Mavzu boʻyicha nazariy maʼlumotlar.*
4. *Topshiriqning mazmuni.*
5. *Topshiriqni bajarilish jarayoni (algoritmi).*
6. *Topshiriq natijasi*

Mustaqil mashgʻulotlarini bajarish boʻyicha har bir talabaga 4 ta topshiriq: ***referat yozish, berilga savollarga javob yozish, berilgan mavzuni konspektlashtirish, tushunchalarga yozma izoh berish.***

***I. Referat mavzulari*** talabalarning har biri uchun alohida topshiriq sifatida taqsimlab beriladi, yaʼni talabalar guruh jurnalidagi tartib raqamiga mos referat mavzularini bajaradilar.

Referatning tuzilishi quyidagicha boʻladi:

1. *Titul varaqasi.*
2. *Reja.*
3. *Kirish qismi.*
4. *Asosiy qismi.*
5. *Xulosa.*
6. *Ilovalar (mavzuga oid krossvord va test) .*
7. *Foydalanilgan adabiyotlar.*

***II. Berilgan savollarga javob tayyorlash va daftarga qayd etish.***

***III. Tayanch iboralarga izoh beriladi,***

Mustaqil topshiriqlar talabalar tomonidan oʻz vaqtida bajarilib, faylli papkaga joylashtiriladi va laboratoriya ishlari hisobotlari bilan birga nazorat oʻtkazish davrigacha oʻqituvchiga topshirishlari lozim.

# 1-mustaqil ish

## 1-mavzu: Excel dasturida ishlash

### 1-topshiriq. Excel dasturida hisoblang

1.	$Z = \frac{\sqrt[5]{x_1^4 - \log_2 x_2 }}{10,1}$	$x_1 = 0,8 \quad x_2 = 5,4$
2.	$Y_1 = \frac{\left  \sin \frac{\pi}{8} + x_1 \right }{20,2x^2}$	$x_1 = 0,8 \quad x_2 = 5,4$
3.	$Y_2 = \frac{\lg x_1^2 - x_2 }{\cos \frac{\pi}{x_3} - 10,3}$	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_3 = -5,22$
4.	$B = \frac{ x_1 ^{x^2} + 55,5}{\log_3 x_3 - x_4 }$	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_3 = -5,22 \quad x_4 = 6,43$
5.	$C = \sqrt{\left  \text{Arc sin} \left( \frac{0,4 - x_1^3}{x_1^3} \right) + 0,6 \right }$	$x_1 = 0,8$
6.	$D = \log_2 \left  \frac{x_1}{x_2} - x_3 \cdot x_4 \right  + \frac{x_1}{40,7}$	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_3 = -5,22 \quad x_4 = 6,43$
7.	$E = x_1 - \arccos \frac{x_2 - 10,8}{x_2 + 12}$	$x_1 = 0,8 \quad x_2 = 5,4$
8.	$A = \frac{x_1 \cdot x_2}{30,4 - x_3} + \text{arctg} \sqrt[3]{ x_1^3 - x_2 }$	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_3 = -5,22$
9.	$F = 50,9 - \lg \left  \sqrt{ x_1 } - x_2 \right $	$x_1 = 0,8 \quad x_2 = 5,4$
10.	$H = \frac{\text{Arctg} \frac{x_1^2 - x_2}{3x_3}}{x_4 - 1,02}$	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_3 = -5,22 \quad x_4 = 6,43$
11.	$G = \frac{x_1 - x_2}{\lg x_5 } + 1,32$	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_5 = -4,4$
12.	$I = \left  \frac{x_1 - x_2}{21,15} \right ^{x_3} \ln 13$	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_3 = -5,22$
13.	$J = \left  \sqrt{ x_1^5 - x_2^5 } - x_3 \right ^{x_4} - 21,2$	$x_2 = 5,4 \quad x_3 = -5,22 \quad x_4 = 6,43$
14.	$K = \frac{\sqrt{2^{x_2} + x_3^2}}{1,3 * x_4 * \lg \left  \frac{x_3}{2} \right }$	$x_2 = 5,4 \quad x_3 = -5,22 \quad x_4 = 6,43$
15.	$L = \log_5  x_1 - x_2^2  - 11,5$	$x_1 = 0,8 \quad x_2 = 5,4$
16.	$M = \frac{\sqrt{ \sin^2 39^\circ - x_1 }}{x_1 - 31,62}$	$x_1 = 0,8 \quad x_2 = 5,4$
17.	$N = 1,73 - \log_{3/2}  x_1 - x_2^2 $	$x_1 = 0,8 \quad x_2 = 5,4$

18.	$P = \sin \pi / 1,8 + \frac{3^{x_2} + x_3}{x_4 - 20}$	$x_2 = 5,4 \quad x_3 = -5,22 \quad x_4 = 6,43$
19.	$R = \lg \left  x_1 - \sin x_2 + \frac{x_3}{31,94} \right $	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_3 = -5,22$
20.	$S = \sqrt[5]{\left  x_1 - \sqrt[3]{x_2^2} \right } + \frac{2,02}{x_3}$	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_3 = -5,22$
21.	$T = \operatorname{tg} 13^\circ - \log_{3/2}  x_1 - x_2  + 12,1$	$x_1 = 0,8 \quad x_2 = 5,4$
22.	$U = \operatorname{arctg} \sqrt{ x_1 - \sqrt[5]{x_2^2 + x_3^2} } - 12,21$	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_3 = -5,22$
23.	$V = \cos \left( \log_5 \left  \frac{x_1}{x_2} \right  \right) - 22,23$	$x_1 = 0,8 \quad x_2 = 5,4$
24.	$W = \lg  x_1  \frac{3x_2 - 2,43}{x_3}$	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_3 = -5,22$
25.	$Y = \operatorname{arctg} \frac{x_1 - x_2}{2x_1 + x_3} - \frac{x_3}{52,57}$	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_3 = -5,22$
26.	$Z = \frac{72,67}{x_1} - \operatorname{arctg} \frac{x_1 - x_3}{10 + x_3}$	$x_1 = 0,8 \quad x_3 = -5,22$
27.	$Z_1 = \frac{\log_3  x_1  - \log_2  x_2 }{l^{x_3} + 12,73}$	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_3 = -5,22$
28.	$Z_3 = \arcsin \frac{2}{x_1} + 2,8 * \ln  x_2 $	$x_1 = 0,8 \quad x_2 = 5,4$
29.	$Z_4 = 2,93 l^{\cos x_1} + \frac{x_2 - x_3}{x_4}$	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_3 = -5,22 \quad x_4 = 6,43$
30.	$Z_2 = \frac{x^1 + 3,02}{\ln  x_2 - x_3 }$	$x_1 = 0,8 \quad x_2 = 5,4 \quad x_3 = -5,22 \quad x_4 = 6,43$

## 2-topshiriq. Tarmoqlanuvchi jarayonni Excelda bajaring.

1.	$Z_1 = \begin{cases} 2.71 - 4x_4^2 & \text{a} \text{ g} \text{ a} \text{ p} \quad \ln  x_1 - 2  < x_2 \\ 2.71 + 4x_4^2 & \text{a} \text{ g} \text{ a} \text{ p} \quad \ln  x_1 - 2  < x_2 \quad x_1 = -19.54; \quad x_2 = -1.938; \quad x_4 = 2.804 \\ x_4^3 + 22.8 & \text{a} \text{ g} \text{ a} \text{ p} \quad \ln  x_1 - 2  = x_2 \end{cases}$
2.	$B = \begin{cases} \cos 47^\circ & \text{a} \text{ g} \text{ a} \text{ p} \quad x_3 > e^{x_2} \\ \arccos 0.3 & \text{a} \text{ g} \text{ a} \text{ p} \quad x_3 = e^{x_2} \\ 0 & \text{a} \text{ g} \text{ a} \text{ p} \quad x_3 < e^{x_2} \end{cases} \quad x_1 = 18.11; \quad x_2 = -1.938$
3.	$C = \begin{cases} \log_2  x_1  & \text{a} \text{ g} \text{ a} \text{ p} \quad \sqrt{ x_2 } > 3 \\ \operatorname{tg} \frac{\pi}{7} & \text{a} \text{ g} \text{ a} \text{ p} \quad \sqrt{ x_2 } < 3; \quad x_1 = -19.54; \quad x_2 = -1.9381 \\ \operatorname{Arc} \cos 0.3 & \text{a} \text{ g} \text{ a} \text{ p} \quad \sqrt{ x_2 } = 3 \end{cases}$

4.	$D = \begin{cases} x_1 - x_2 & \text{агаар } \lg 16 > x_3 \\ (x_1 - x_2)^2 & \text{агаар } \lg 16 < x_3; \quad x_1 = -19.54; x_2 = -1.938; x_3 = 18.11; x = 41.3 \\ \frac{(x - x_2)^3}{30.4} & \text{агаар } \lg 16 = x_3 \end{cases}$
5.	$E = \begin{cases} x_1 + x_2 & \text{агаар } \ln 55 > x_3 \\ x_2^2 - x_1 & \text{агаар } \ln 55 < x_3; \quad x_1 = -19.54; x_2 = -1.938; x_3 = 18.11; \\ 0.51 * \cos 35^\circ & \text{агаар } \ln 55 = x_3 \end{cases}$
6.	$E = \begin{cases} x_1 + x_2 & \text{агаар } \ln 55 > x_3 \\ x_2^2 - x_1 & \text{агаар } \ln 55 < x_3; \quad x_1 = -19.54; x_2 = -1.938; x_3 = 18.11; \\ 0.51 * \cos 35^\circ & \text{агаар } \ln 55 = x_3; \end{cases}$
7.	$F = \begin{cases} \sqrt{ x_1 + x_2 } & \text{агаар } 2^{x_1} < 1 \\ x_3 - x_4^2 & \text{агаар } 2^{x_1} = 1; \quad x_1 = -19.5; x_2 = -1.9; x_3 = 18.1; x_4 = 2.804 \\ \sin 42^\circ + 0.6 & \text{агаар } 2^{x_1} > 1 \end{cases}$
8.	$C = \begin{cases} \operatorname{tg} 35^\circ + 2x & \text{агаар } 12 > \lg x_3  \\ e^{-x_2} & \text{агаар } 12 = \lg x_3 ; \quad x = 41.3; x_2 = -1.938; x_3 = 18.11; \\ -0.7 & \text{агаар } 12 < \lg x_3  \end{cases}$
9.	$H = \begin{cases} \operatorname{tg} 13^\circ & \text{агаар } x_3 = (x_1 - x_4) \\ \operatorname{tg} x_1 - 1  & \text{агаар } x_3 > (x_1 - x_4); \quad x_1 = -19.5; x_2 = -1.9; x_3 = 18.1; x_4 = 2.8 \\ 5x_2 - 40.8 & \text{агаар } x_3 < (x_1 - x_4) \end{cases}$
10.	$I = \begin{cases} \sqrt{ x_1 - x_2 } & \text{агаар } e^{x_3} > 1 \\ \lg x_2  & \text{агаар } e^{x_3} < 1; \quad x_1 = -19.54; x_2 = -1.938; x_3 = 18.11; \\ \operatorname{Arc} \cos \frac{\pi}{10} & \text{агаар } e^{x_3} = 1 \end{cases}$
11.	$J = \begin{cases} \sqrt{ x_1 - x_2 } & \text{агаар } -\ln x_1  < 2 \\ e^{x_3 - 1} & \text{агаар } -\ln x_1  > 2; \quad x_1 = -19.54; x_2 = -1.938; x_3 = 18.11; \\ 1.02 - \cos \frac{\pi}{3} & \text{агаар } -\ln x_1  = 2 \end{cases}$
12.	$K = \begin{cases} 5x_1^2 & \text{агаар } \lg x_1  < x_4 \\ 6x_2^2 + 1 & \text{агаар } \lg x_1  > x_4; \quad x_1 = -19.54; x_2 = -1.938; x_3 = 18.11; x_4 = 2.804 \\ 41.13\sqrt{ x_3 } & \text{агаар } \lg x_1  = x_4 \end{cases}$
13.	$L = \begin{cases} \log_3 x_1  & \text{агаар } \sin 47^\circ > \cos x_3 \\ \log_{\frac{1}{3}} x_2^2 & \text{агаар } \sin 47^\circ < \cos x_3; \quad x_1 = -19.54; x_2 = -1.938; x_3 = 18.11; \\ 1.2 \frac{\pi}{3} & \text{агаар } \sin 47^\circ = \cos x_3 \end{cases}$

14.	$M = \begin{cases} \text{Arc sin } \frac{3}{8} & \text{a2ap } \lg x_1 + 10  < x_3 \\ e^{x_1 - 3} & \text{a2ap } \lg x_1 + 10  = x_3; x_1 = -19.1; x_2 = -1.2; x_3 = 14.11; \\  x_2^2 - 11.3 ^{x_2} & \text{a2ap } \lg x_1 + 10  > x_3 \end{cases}$
15.	$N = \begin{cases} x_1 - x_2 & \text{a2ap } \sqrt[3]{ x_1 } > 1.5 \\ x_2 - x_1 & \text{a2ap } \sqrt[3]{ x_1 } < 1.5; x_1 = -19.54; x_2 = -1.938; \\ 1.4 - \sin 37^\circ & \text{a2ap } \sqrt[3]{ x_1 } = 1.5 \end{cases}$
16.	$P = \begin{cases} \text{Arc cos } 0.7 - \frac{x_1}{2} & \text{a2ap } x_3 > -\sqrt{ x_1 } \\ -\frac{\pi}{2} + 5x_2^2 & \text{a2ap } x_3 < -\sqrt{ x_1 }; x_1 = -12.1; x_2 = -1.5; x_3 = 11.3 \\ 1.53 & \text{a2ap } x_3 = -\sqrt{ x_1 } \end{cases}$
17.	$Q = \begin{cases} 6x_1 & \text{a2ap } 2^{x_1} < \ln x_1  \\ 10x_2 & \text{a2ap } 2^{x_1} > \ln x_1 ; x_1 = -19.54; x_2 = -1.938; x_3 = 18.11 \\ 3x_3 + 31.64 & \text{a2ap } 2^{x_1} = \ln x_1  \end{cases}$
18.	$S = \begin{cases} \cos 66 + x_1 & \text{a2ap } \ln \left  \frac{x_1}{x_2} \right  \\ \text{Sin } 46^\circ & \text{a2ap } \ln \left  \frac{x_1}{x_2} \right  & x_1 = -19.54; x_2 = 1.958 & x_3 = 18.11 \\ 21.7e^{-x_3} & \text{a2ap } \ln \left  \frac{x_1}{x_2} \right  \end{cases}$
19.	$Z_2 = \begin{cases} \sqrt{x_1^2 + x_2^2} & \text{a2ap } \ln 13 = x \\ \sqrt[3]{x_1^2 + x_2^2} & \text{a2ap } \ln 13 < x \quad x = 41.3; x_1 = -19.54; x_2 = -1.938 \\ \cos \frac{\pi}{8} + 12.93 & \text{a2ap } \ln 13 > x \end{cases}$
20.	$Z_3 = \begin{cases} \sin 37^\circ - 2x & \text{a2ap } 3x_2 < e^{x_1} \\ \cos \frac{\pi}{8} + x & \text{a2ap } 3x_2 > e^{x_1} \quad x = 41.; x_1 = -19.4; x_2 = -1.9; x_3 = 18.1 \\ 6x_3 - 3.07 & \text{a2ap } 3x_2 = e^{x_1} \end{cases}$
21.	$S = \begin{cases} e^{-x_2} + x & \text{a2ap }  \cos x_1  = 0.5 \\ 6x_2 & \text{a2ap }  \cos x_1  > 0.5 \\ 31.82 & \text{a2ap }  \cos x_1  < 0.5 \end{cases} \quad x = 41.3; x_1 = -19.54; x_2 = -1.938$
22.	$T = \begin{cases} e^{x_1} + 1 & \text{a2ap } \text{Arctg} x_2 > \frac{\pi}{3} \\ \frac{1}{e^{x_1}} + 1 & \text{a2ap } \text{Arctg} x_2 < \frac{\pi}{3} \\ 31.97 & \text{a2ap } \text{Arctg} x_2 = \frac{\pi}{3} \end{cases} \quad x_1 = -19.54; x_2 = -1.938$

23.	$Y = \begin{cases} \operatorname{tg} 23.4^{\circ} + 1.3x & \text{a} \text{ g} \text{ a} \text{ p} \quad e^{x_3} > x_4 \\ \operatorname{Arc} \sin 0.88 + x_2 & \text{a} \text{ g} \text{ a} \text{ p} \quad e^{x_3} < x_4 \\ 41.37 & \text{a} \text{ g} \text{ a} \text{ p} \quad e^{x_3} = x_4 \end{cases} \quad x = 41.3; \quad x_2 = -1.938; \quad x_3 = 18.11; \quad x_4 = 16.27$
24.	$Z = \begin{cases} \sqrt[5]{ 1+x_1 } & \text{a} \text{ g} \text{ a} \text{ p} \quad e^{x_3} > 30 \\ \cos 41^{\circ} & \text{a} \text{ g} \text{ a} \text{ p} \quad e^{x_3} < 30 \\ 12.41 - \ln x_2  & \text{a} \text{ g} \text{ a} \text{ p} \quad e^{x_3} = 30 \end{cases} \quad x_1 = -19.54; \quad x_2 = -1.938; \quad x_3 = 18.11$
25.	$Y_1 = \begin{cases} x_1 - x_2 & \text{a} \text{ g} \text{ a} \text{ p} \quad 2x_1 < \ln x_2  \\ x_2 - x_1 & \text{a} \text{ g} \text{ a} \text{ p} \quad 2x_1 > \ln x_2  \\ x_3 - 12.54 & \text{a} \text{ g} \text{ a} \text{ p} \quad 2x_1 = \ln x_2  \end{cases} \quad x_1 = -19.54; \quad x_2 = -1.938; \quad x_3 = 18.11$
26.	$Y_2 = \begin{cases} 10 + x_1^2 & \text{a} \text{ g} \text{ a} \text{ p} \quad x_1 = \sin x_2 \\ e^{x_3} & \text{a} \text{ g} \text{ a} \text{ p} \quad x_1 > \sin x_2 \\ (6 - x_4)^2 - 22 & \text{a} \text{ g} \text{ a} \text{ p} \quad x_1 < \sin x_2 \end{cases} \quad x_1 = -19.5; \quad x_2 = -1.9 \quad x_3 = 18.1; \quad x_4 = 2.8$
27.	$Y_3 = \begin{cases} \operatorname{Arc} \sin 0.47 & \text{a} \text{ g} \text{ a} \text{ p} \quad \cos 84^{\circ} > x_2 \\ 1 & \text{a} \text{ g} \text{ a} \text{ p} \quad \cos 84^{\circ} < x_2 \\ 2.71x_3 & \text{a} \text{ g} \text{ a} \text{ p} \quad \cos 84^{\circ} = x_2 \end{cases} \quad x_2 = -1.938; \quad x_3 = 18.11$
28.	$Z_1 = \begin{cases} 2.71 - 4x_4^2 & \text{a} \text{ g} \text{ a} \text{ p} \quad \ln x_1 - 2  < x_2 \\ 2.71 + 4x_4^2 & \text{a} \text{ g} \text{ a} \text{ p} \quad \ln x_1 - 2  < x_2 \\ x_4^3 + 22.8 & \text{a} \text{ g} \text{ a} \text{ p} \quad \ln x_1 - 2  = x_2 \end{cases} \quad x_1 = -19.54; \quad x_2 = -1.938; \quad x_4 = 2.804$
29.	$Z_2 = \begin{cases} \sqrt{x_1^2 + x_2^2} & \text{a} \text{ g} \text{ a} \text{ p} \quad \ln 13 = x \\ \sqrt[3]{x_1^2 + x_2^2} & \text{a} \text{ g} \text{ a} \text{ p} \quad \ln 13 < x \\ \cos \frac{\pi}{8} + 12.93 & \text{a} \text{ g} \text{ a} \text{ p} \quad \ln 13 > x \end{cases} \quad x = 41.3; \quad x_1 = -19.54; \quad x_2 = -1.938$
30.	$Z_3 = \begin{cases} \sin 37^{\circ} - 2x & \text{a} \text{ g} \text{ a} \text{ p} \quad 3x_2 < e^{x_1} \\ \cos \frac{\pi}{8} + x & \text{a} \text{ g} \text{ a} \text{ p} \quad 3x_2 > e^{x_1} \\ 6x_3 - 3.07 & \text{a} \text{ g} \text{ a} \text{ p} \quad 3x_2 = e^{x_1} \end{cases} \quad x = 41.3; \quad x_1 = -19.54; \quad x_2 = -1.938; \quad x_3 = 18.11$

### 3-topshiriq. Takrorlanuvchi jarayonlarni Excelda bajaring.

1	$y = a \lg (b+x)^{1/3} + a  + \operatorname{tg} 75 \quad a = 30,01; b = 20,5; \quad x = 1(25)150$
2	$z = ax^2 + \left( \frac{ax^2 + b}{\cos 42^{\circ}} \right)^{3/5} \quad a = 0,02; \quad b = 35; \quad x = 20(-2)10$
3	$t = \frac{\arcsin^2 \frac{a}{x} - \sqrt{ \cos 30^{\circ} - y }}{ax + c} \quad c = 4; \quad a = 14,03; \quad y = 68 \quad x = 15(1)20$
4	$l = \sqrt{(e^a + \ln a )^2 + 1} + \frac{t^2 - 1}{\sin 40^{\circ} * b} \quad b = 5; \quad a = 4,4 \quad t = 10(-0,1)9$

5	$s = \left( \frac{\sin^3 a + \ln x^2 + a }{1 + \lg 10x  - b} \right)^2 \quad a = -2,05; \quad b = 12,124 \quad x = -14(1) - 4$
6	$b = (y^2 + 1)^{1/7} - \left( \frac{\arcsin \frac{x}{y}}{a^2 x + t} \right)^2 \quad y = 31; \quad a = 2,06; \quad t = 18; \quad x = 30(-10) - 30$
7	$z = e^{(a-x)^2 b} + \ln \left  \frac{(a-x)^2}{bt} \right  \quad a = 0,07; \quad b = 0,1; \quad t = 10 \quad x = -5(1)5$
8	$y = \sin^2 \frac{x}{a+b} + \sqrt{ b^2 - t^2  + 1} \quad a = 18,08; \quad b = 40; \quad t = 25 \quad x = 0,5(0,1)1,5$
9	$p = \ln \left  \frac{2a + x^2}{a - x^2} \right  + \frac{\sqrt[3]{t - a^2}}{\sqrt{ t - b^2 }} \quad a = 15,9; \quad t = 500; \quad b = 200 \quad x = 0,5(0,1)1,5$
10	$z = \sin^{1/3} \left  \frac{2x - a}{a + b} \right  + \sqrt{ b^2 x - a^2 } \quad b = 3,71; \quad a = 7,10; \quad x = -0,1(-1,1) - 10$
11	$p = \ln x  + \ln x^2 + \sin 35^0  + \frac{\sqrt[3]{1 - \cos \frac{\pi}{x}}}{a + n^2} \quad a = -0,11; \quad n = 22; \quad x = 10(5)50$
12	$s = \frac{ax^2 + bx}{\sqrt{ 1 + ax^2 }} + e^{\sin 42^0} \arcsin \frac{x}{a} \quad a = 10,12; \quad b = 30; \quad x = 10(-1)0$
13	$l = \frac{\operatorname{tg} 47^0 \arccos \frac{\pi}{x}}{\sqrt{1 + \sqrt{\frac{a-c}{x}}}}; \quad a = 50,13; \quad c = 5,13; \quad x = 10(-0,4)6$
14	$p = \frac{i_m^2 r}{2} + \frac{i_m^2 r}{2} \cos 2wt; \quad i_m = 1,44; \quad r = 30; \quad w = 45; \quad t = 0(0,5)3$
15	$y = 2 \sin^2 x - a^3 \cos 2x + be^{-4x}; \quad a = 3,15; \quad b = 500; \quad x = 2,7(-0,25)0,2$
16	$z = \frac{\operatorname{tg} 60^0 \sqrt{ 1 + \sqrt[5]{x+a} }}{\arcsin \frac{25\pi}{x}} + \lg \left  \frac{x+c}{n} \right ; \quad a = 500,16; \quad c = 25; \quad n = 30; \quad x = 100(2)80$
17	$y = e^{\cos 57^0} \operatorname{tg} \frac{x}{\pi} + \frac{a - x^2}{\sqrt[4]{ 1 + \sin x }}; \quad a = 25,17; \quad x = 3(-0,1)2$
18	$p = \left( \frac{t \arcsin \frac{a}{b}}{y^3 + b} \right)^3 - \sqrt[7]{\sin^2 ta}; \quad y = 15; \quad b = 20; \quad a = -0,18; \quad t = 3(-0,5) - 5$
19	$s = (\ln ax  - c)^{2/3} + \frac{a+b}{\sqrt[3]{cx^2}}; \quad a = 10,49; \quad c = 0,01; \quad b = 100; \quad x = 10(7)80$
20	$x = \frac{t-1}{at^2 + bt} + \lg t^2 - b^2 ; \quad a = 0,2; \quad b = 2; \quad t = -10(2)10$

21	$r = \cos^3 \frac{\pi}{x} + \arcsin \frac{y^2 + 1}{4ax + 10}; a = -10,2; y = 6,5; x = -35(0,5) - 8$
22	$y = (a + \ln x  + \lg x )^3 + \frac{x}{b+x}; a = 40,22; b = 15; x = 10(10,5)115$
23	$t = \left(\frac{1-ax^2}{1+a^2}\right)^3 + \frac{\sqrt{b^2 \sin 52^0}}{\sqrt{a \cos 52^0}}; a = 70,23; b = 10,15; x = 15,5(0,2)17,5$
24	$s = \sqrt[3]{b^2 - \operatorname{tg} 47^0} + \frac{\sin \frac{\pi}{x} - ax^2}{1+a^2}; a = -12,24; b = 7,77; x = 5,5(-0,1)4$
25	$m = \frac{(e^{a^2} + c)^{\sqrt[3]{3}}}{\sin 40^0 + a} + \lg x-b  \ln x-b ; b = 3,24; c = 30; a = 2,25; x = 100(-2)80$
26	$l = \frac{1-a^2t}{1+c^2} + \arcsin\left(\frac{61+t^3}{4t^3}\right); a = 10,26; c = 7; t = 5,1(0,15)6,6$
27	$n = \frac{r^3}{k-x} + \lg(x^2) + \sqrt{\frac{1+\cos 73^0}{ka}}; r = 12,5; k = 35; a = 0,27; x = 100(-5,5)45$
28	$t = \operatorname{arctg} \frac{y^2 + 10}{y^3 - 20} + \frac{ax^2 + y}{x^2 - y}; a = 10,28; y = 3,7; x = 10(-0,5)5$
29	$z = \lg t^7  + \sqrt{1+a^2t} + b \sin^2 41^0; a = 3,29; b = 35; t = 25(1)35$
30	$p = \frac{t^2 - a^2}{c^2} + \sin\left(\sqrt{\frac{1+c^2}{t}} + a\right); a = 0,30; c = 7; t = -1,5(0,5)3$

#### 4-topshiriq. Excelda funksiyalar grafigini chizing.

1	$y = \sin x; x = [-3(0,2)\beta]$	16	$y = \sin x - 0,5; x = [-3(0,2)\beta]$
2	$y = \sin 2x; x = [-3(0,2)\beta]$	17	$y = -\sin x + 0,5; x = [-3(0,2)\beta]$
3	$y = 2 \sin x; x = [-3(0,2)\beta]$	18	$y = -\sin x - 0,5; x = [-3(0,2)\beta]$
4	$y = -\sin x; x = [-3(0,2)\beta]$	19	$y = \cos x + 0,5; x = [-3(0,2)\beta]$
5	$y = -2 \sin x;$	20	$y = \cos x - 0,5; x = [-3(0,2)\beta]$
6	$y = \sin(-2x); x = [-3(0,2)\beta]$	21	$y = -\cos x + 0,5; x = [-3(0,2)\beta]$
7	$y = \sin^2 x; x = [-3(0,2)\beta]$	22	$y = -\cos x - 0,5; x = [-3(0,2)\beta]$
8	$y = \cos x; x = [-3(0,2)\beta]$	23	$y = \sin 2x + 0,5; x = [-3(0,2)\beta]$
9	$y = \cos 2x; x = [-3(0,2)\beta]$	24	$y = -\sin 2x + 0,5; x = [-3(0,2)\beta]$
10	$y = 2 \cos x; x = [-3(0,2)\beta]$	25	$y = \cos 2x + 0,5; x = [-3(0,2)\beta]$
11	$y = \cos^2 x; x = [-3(0,2)\beta]$	26	$y = -\cos 2x + 0,5; x = [-3(0,2)\beta]$
12	$y = -\cos x; x = [-3(0,2)\beta]$	27	$y = \sin 2x - 0,5; x = [-3(0,2)\beta]$
	$y = -\cos 2x; x = [-3(0,2)\beta]$	28	$y = -\sin 2x - 0,5; x = [-3(0,2)\beta]$
14	$y = -2 \cos x; x = [-3(0,2)\beta]$	29	$y = \cos 2x - 0,5; x = [-3(0,2)\beta]$
15	$y = \sin x + 0,5; x = [-3(0,2)\beta]$	30	$y = -\cos 2x - 0,5; x = [-3(0,2)\beta]$

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3. Шинайнер И. Excel 7.0 для Windows 95: Справочник. — М.: Бинном, 1997. — 488 с.
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### 2-mustaqil ish

#### Mavzu. Maple muhitida ishlash

#### 1-topshiriq

#### 1) Ifodalar qiymatini toping.

$$1. y = \frac{\sqrt{a^2 - b + \sqrt{c}} \sqrt{a - \sqrt{b + \sqrt{c}}} \sqrt{a + \sqrt{b + \sqrt{c}}}}{\sqrt{\frac{a^3}{b} - 2a + \frac{b}{a} - \frac{c}{ab}}}, \text{ bu yerda } a=4.8, b=1.2.$$

$$2. y = \left(\frac{a}{b} + \frac{b}{a} + 2\right) \left(\frac{a+b}{2a} - \frac{b}{a+b}\right) \div \left[\left(a + 2b + \frac{b^2}{a}\right) \left(\frac{a}{a+b} + \frac{b}{a-b}\right)\right], \text{ bu yerda } a=0.75, b=4/3.$$

$$3. y = \frac{a^{\frac{3}{2}} + b^{\frac{3}{2}}}{(a^2 - ab)^{\frac{2}{3}}} \div \frac{a^{-\frac{2}{3}} \sqrt{a-b}}{a\sqrt{a-b}\sqrt{b}}, \text{ bu yerda } a=1.2, b=3/5.$$

$$4. y = \frac{|2x-3|+6}{2x-3} \sqrt{\frac{1}{x}(9x^{-1}+4x-12)}, \text{ bu yerda } x=-3.$$

$$5. z = \left(\frac{1}{x-y} + \frac{3xy}{y^3-x^3}\right) \div \left(\frac{x^2+y^2}{x^2-y^2} - \frac{x+y}{2x-2y}\right), \text{ bu yerda } x=1, y=0.$$

$$6. y = \left[ \frac{\frac{x^3-1}{x+1} \frac{x}{x^3+1}}{\left((x+1)^2 - x\right) \div \left((x-1)^2 + x\right) \left(1 - \frac{1}{x}\right)} \right]^{\frac{1}{2}}, \text{ bu yerda } x=-2.$$

$$7. y = \left[ \left(\frac{1}{a^2} + \frac{1}{b^2}\right) \left(\frac{1}{a^2} + 5\frac{1}{b^2}\right) - \left(\frac{1}{a^2} + 2\frac{1}{b^2}\right) \left(\frac{1}{a^2} - 2\frac{1}{b^2}\right) \right] \div \left(2a + 3a^{\frac{1}{2}}b^{\frac{1}{2}}\right), \text{ bu yerda } a=54, b=6.$$

$$8. y = \left[ \left(\frac{1}{a} + \frac{1}{b+c}\right) \div \left(\frac{1}{a} - \frac{1}{b+c}\right) \right] \div \left(1 + \frac{b^2+c^2-a^2}{2bc}\right), \text{ bu yerda } a=1\frac{33}{40}, b=0.625, c=3.2.$$

#### 2) Ifodani soddalashtiring

$$1. \frac{2 \sin \alpha - 2 \sin 2\alpha}{2 \sin \alpha + 2 \sin 2\alpha}$$

$$2. \frac{1 - \cos^2 \beta}{\sin \beta \cos \beta}$$

$$3. \frac{\cos x + \sin x}{\cos x - \sin x}$$

$$11. \frac{\sin(2x+y)}{\sin x} - 2 \cos(x+y)$$

$$12. \frac{2 \sin y - \sin 2y}{2 \sin y + \sin 2y}$$

$$13. \operatorname{ctg} x + \operatorname{ctg} 2x + \cos \operatorname{ec} 2x$$

4.  $\frac{2(\cos 2x + 2\cos^2 x - 1)}{\cos x - \sin x - \cos 3x + \sin 3x}$
5.  $\frac{\sin x - \sin 3x + \sin 5x}{\cos x - \cos 3x + \cos 5x}$
6.  $\frac{\sin x + \cos(2y - x)}{\cos x - \sin(2y - x)}$
7.  $\frac{1 + \sin 2x}{\cos 2x}$
8.  $\frac{\sin x + \cos(2y - x)}{\cos x - \sin(2y - x)}$
9.  $\frac{\cos 2x}{\operatorname{ctg}^2 x - \operatorname{tg}^2 x}$
10.  $\sin^2 x + \sin^2 y + 2\sin x \sin y \cos(x + y)$
14.  $\frac{\sqrt{2} - \cos x - \sin x}{\sin x - \cos x}$
15.  $\cos 2x + \sin 2x \operatorname{tg} x$
16.  $\frac{1 + \operatorname{tg} 2x \operatorname{tg} x}{\operatorname{ctg} x + \operatorname{tg} x}$
17.  $\frac{1 + \cos x + \cos 2x + \cos 3x}{\cos x + 2\cos^2 x - 1}$
18.  $1 + \sin x + \cos x + \operatorname{tg} x$
19.  $2 + \operatorname{tg} 2x + \operatorname{ctg} 2x$
20.  $\frac{\cos 2x}{\operatorname{ctg}^2 x - \operatorname{tg}^2 x}$

### 3) Ko'paytuvchilarga ajratish

1.  $4a^2 - c^4 - 2ac - c^3$
2.  $5a^5 x^3 + 5a^2 x^3$
3.  $x^3 - 3x - 2$
4.  $(x - y)^3 - 8y^3$
5.  $3x^3 + x^2 - x - 3$
6.  $a^4 + 3a^2 b^2 + 4b^4$
7.  $a^3 + a^2 c + abc + b^3$
8.  $2a^2 + ab - b^2 - 2a + b$
9.  $3x^2 - 42xy + 147y^2$
10.  $x^5 + x^4 + 1$

### 4) Sonlarni bir sanoq sistemasidan boshqa sanoq sistemasiga o'tkazish:

- 1)  $(101010111001,001)_2 \rightarrow (?)_8 \rightarrow (?)_{16}$
- 2)  $(2356)_8 \rightarrow (?)_2 \rightarrow (?)_{10} \rightarrow (?)_{16}$
- 3)  $(2ABS)_{16} \rightarrow (?)_2 \rightarrow (?)_{10}$
- 4)  $(111111001,001)_2 \rightarrow (?)_8 \rightarrow (?)_{16}$
- 5)  $(2557)_8 \rightarrow (?)_2 \rightarrow (?)_{10} \rightarrow (?)_{16}$
- 6)  $(28678)_{10} \rightarrow (?)_2 \rightarrow (?)_8 \rightarrow (?)_2$

### 5) Hisoblang

1.  $\sin\left[\frac{1}{2}\operatorname{arctg}\left(-\frac{3}{4}\right)\right]$
2.  $\sin\left[\frac{1}{2}\operatorname{arcsin}\left(-\frac{2\sqrt{2}}{3}\right)\right]$
3.  $\operatorname{ctg}\left[\frac{1}{2}\operatorname{arccos}\left(-\frac{4}{7}\right)\right]$
4.  $\operatorname{tg}\left(5\operatorname{arg}\operatorname{tg}\frac{\sqrt{3}}{3} - \frac{1}{4}\operatorname{arcsin}\frac{\sqrt{3}}{2}\right)$
5.  $\sin\left(3\operatorname{arg}\operatorname{tg}\sqrt{3} + 2\operatorname{arccos}\frac{1}{2}\right)$
6.  $\cos\left(3\operatorname{arg}\sin\frac{\sqrt{3}}{3} - \operatorname{arccos}\left(-\frac{1}{2}\right)\right)$
7.  $\operatorname{arctg}(3 + 2\sqrt{2}) - \operatorname{arctg}\frac{\sqrt{2}}{2}$
8.  $\operatorname{arccos}\sqrt{\frac{2}{3}} - \operatorname{arccos}\frac{\sqrt{6} + 1}{2\sqrt{3}}$
9.  $\operatorname{arcsin}\frac{4}{5} + \operatorname{arcsin}\frac{5}{13} + \operatorname{arcsin}\frac{16}{65}$
10.  $2\operatorname{arctg}\frac{1}{5} + \operatorname{arctg}\frac{1}{4}$

### 6) Bajaring

1. 36, 89, 96, 65, 23 sonlarining eng kattasi va kichigini toping.
2. 17, 15, 34, 125 sonlarining eng kichik umumiy karralisini toping.
3. 5, 15, 35, 125 sonlarining eng katta umumiy bo'luvchisini toping.
4. 34 va 12 sonlarining butun bo'linishi va qoldig'ini toping.

5.  $\frac{12}{5}$  va  $\frac{37}{18}$  kasr sonlarining butun va kasr qismlarini ajrating.
6.  $\frac{12}{5}$  va  $\frac{37}{18}$  kasrlarni yaxlitlang.

### 7) Funktsiyalar qiymatini hisoblang

1.  $f(x, y) = \sqrt{x+2y+3xy}$ ,  $\bar{o}y$  epda  $x = 4, y = 6.7$
2.  $f(x, y, z) = \sqrt{x^3+2y^3+3xyz}$ ,  $\bar{o}y$  epda  $x = 4, y = 6.7, z = 12.34$
3.  $f(x, y) = \ln|x^4+y^4+xy|$   $\bar{o}y$  epda  $x = -4, y = -6.7$
4.  $f = \begin{cases} x^2 + xy, & \text{agar } x > 3 \\ y^2 + xy, & \text{agar } x = 3 \\ x^2 + y^2, & \text{agar } x < 3 \end{cases}$  funksiyani aniqlang va unga 7 sonini qo'shing.
5.  $f(x, y) = \frac{\sin(2x+y)}{\cos(3x+y)}$   $\bar{o}y$  epda  $x = \frac{\pi}{6}, y = \frac{\pi}{3}$
6.  $f(x) = x \arcsin x + \sqrt{1-x^2}$ ,  $\bar{o}y$  epda  $x = 1.4$
7.  $f(x) = \ln \arctg \sqrt{1+x^2}$ ,  $\bar{o}y$  epda  $x = -2.4$ .

### 2-topshiriq.

#### 1) Tenglamani yeching.

- |  |  |
|--|--|
| 1. $x = \cos(x)$                         | 11. $e^x = x^2 + 5$                            |
| 2. $x^3 + \sin x = 25$                   | 12. $x = \sin^2 x + 7$                         |
| 3. $x^2 - 2x + 1.5 = 0$                  | 13. $x = \operatorname{tg} x + 1$              |
| 4. $x^2 - \cos x = 27$                   | 14. $x^2 + 3x + 9 = 0$                         |
| 5. $e^x + 1 = x^3$                       | 15. $x^5 + \cos x = 32$                        |
| 6. $\sin 3x + \cos 3x = \sqrt{2}$        | 16. $\sin x + \sin 2x + \sin 3x + \sin 4x = 0$ |
| 7. $5 \cos 2x = 4 \sin x$                | 17. $3 \operatorname{tg}^2 x - \sec^2 x = 1$   |
| 8. $\cos x - \cos 2x = \sin 3x$          | 18. $\sin^4 x + \cos^4 x = \cos 4x$            |
| 9. $\sin x \sin 7x = \sin 3x \sin 5x$    | 19. $\sin x + \cos x = 1 + \sin 2x$            |
| 10. $2 \cos^2 x + 4 \cos x = 3 \sin^2 x$ | 20. $(1 + \cos 4x) \sin 4x = \cos^2 2x$        |

#### 2) Tenglamalar sistemasini yeching.

- |   |   |  |
|---|---|--|
| 1. $\begin{cases} 2x - y = 2 \\ 3x - y = 5 \end{cases}$                                 | 8. $\begin{cases} \frac{x}{3} - \frac{y}{2} = 1 \\ \frac{x}{6} + \frac{y}{8} = 2 \end{cases}$ | 15. $\begin{cases} \frac{1}{5}x + y = 7.6 \\ \frac{1}{7}x - y = 4 \end{cases}$ |
| 2. $\begin{cases} 2x + y = -1 \\ 0.4x - y = -5 \end{cases}$                             | 9. $\begin{cases} x + y = 1 \\ xy = 84 \end{cases}$   | 16. $\begin{cases} 3x - y = 7 \\ x + y = -4 \end{cases}$                       |
| 3. $\begin{cases} x^2 + y^2 = 25 \\ xy = 12 \end{cases}$                                | 10. $\begin{cases} \frac{1}{4}x + y = -5 \\ 7x - y = 3.5 \end{cases}$                         | 17. $\begin{cases} x + xy + y = 11 \\ x^2 y + xy = 30 \end{cases}$             |
| 4. $\begin{cases} 21x - y = -4 \\ 17x + y = -7 \end{cases}$                             | 11. $\begin{cases} 6x + y = -0.2 \\ 2x - y = -5 \end{cases}$                                  | 18. $\begin{cases} x^2 - y^2 = 23 \\ x^2 y = 50 \end{cases}$                   |
| 5. $\begin{cases} x + y + z = 4 \\ x + 2y + 3z = 5 \\ x^2 + y^2 + z^2 = 14 \end{cases}$ | 12. $\begin{cases} \log_3(y-x) = 1 \\ x^2 + y^2 = 25 \end{cases}$                             | 19. $\begin{cases} \log_x ay = p \\ \log_y bx = q \end{cases}$                 |

$$6. \begin{cases} x + y + z = 13 \\ x^2 + y^2 + z^2 = 61 \\ xy + xz = 2yz \end{cases}$$

$$7. \begin{cases} x^2 + y^2 = z^2 \\ xy + yz + zx = 47 \\ (z-x)(z-y) = 2 \end{cases}$$

$$13. \begin{cases} \lg x + \lg y = \lg a \\ 2(\lg x - \lg y) = \lg b \end{cases}$$

$$14. \begin{cases} \log_{xy}(x-y) = 1 \\ \log_{xy}(x+y) = 0 \end{cases}$$

$$20. \begin{cases} 8^{2x+1} = 32 \cdot 2^{4y-1} \\ 5 \cdot 5^{x-y} = \sqrt{25^{2y+1}} \end{cases}$$

### 3) Tengsizliklarni yeching

$$1. \frac{x+1}{x-2} > \frac{3}{x-2} - \frac{1}{2}$$

$$2. \frac{1}{x+2} < \frac{3}{x-3}$$

$$3. (a+1)x + 4 < (3-2a)x - 1$$

$$4. (x+1)(3-x)(x-2)^2 > 0$$

$$5. \frac{x^2+2}{\sqrt{x^2+1}} \geq 2$$

$$6. \frac{3x^2-10x+3}{x^2-10x+25} > 0$$

$$7. \lg(8-x) \geq \lg(x^2+2)$$

$$8. \sin 3x + \cos 3x \leq \sqrt{2}$$

$$9. \operatorname{tg}\left(\frac{\pi}{4} + x\right) + \operatorname{tg} x \geq 2$$

$$10. 9^{x+1} + 3^{x+2} - 18 > 0$$

### 4) Tengsizliklar sistemasini yeching

$$1. \begin{cases} 7(x+1) - 2x > 9 - 4x \\ 3(5-2x) - 1 \geq 4 - 5x \end{cases}$$

$$2. \begin{cases} 3x \leq 5 - 6x \\ 4x - 1 \geq 1 - 3x \\ 7 - 2x > 2x + 9 \end{cases}$$

$$3. \begin{cases} 2x + 1 > 3x + 4 \\ 5x + 3 \geq 8x + 21 \end{cases}$$

$$4. \begin{cases} 5x - 2 \geq 2x + 1 \\ 2x + 3 < 18 - 3x \end{cases}$$

$$5. \begin{cases} \frac{x+1}{y-3} > 1 \\ (x+1)(y-3) \leq 4 \end{cases}$$

$$6. \begin{cases} 2^{\log_2 y} - \log_3 x < 1 \\ y \log_3 x \geq 2 \end{cases}$$

$$7. \begin{cases} \log_3(y-x) < 1 \\ x^2 + y^2 \geq 25 \end{cases}$$

$$8. \begin{cases} x + xy + y < 12 \\ x^2 y + xy^2 \geq 30 \end{cases}$$

$$9. \begin{cases} x^2 - y < 24 \\ x^2 y \leq 25 \end{cases}$$

$$10. \begin{cases} \frac{x}{y} + \frac{y}{x} < \frac{27}{12} \\ x^2 - y^2 \geq 7 \end{cases}$$

## 3-topshiriq

### 1) Funksiya grafigini yasang

$$1. y = x^2 \cos 2x$$

$$3. y = -e^x - 1$$

$$5. y = \cos^2 x - \sin^2 x$$

$$2. y = 7x - x^2 - 10$$

$$4. y = \frac{x^2}{x-2}$$

$$6. y = x - \arcsin(\sin x).$$

### 2) Bitta argumentga bog'liq ikkita funksiya grafigini chizing.

$$1. y = \ln(x+6), y = 3 \ln x$$

$$4. y = \sqrt{x}, y = \sqrt{4-3x}$$

$$2. y = 6x^2 - 5x + 1, y = \cos \pi x$$

$$5. y = 4x - x^2, y = x^2 - 4x + 2$$

$$3. y = \cos \frac{1}{x}, y = x^2 - 2x$$

$$6. y = x^3, y = \frac{\sin x}{x}$$

### 3) Sirt grafigini chizing.

$$1. f(x, y) = \frac{y}{x^2 + y^2}$$

$$4. f(x, y) = x\sqrt{y}$$

$$2. f(x, y) = x^2y + x$$

$$5. f(x, y) = \frac{x}{y} + \frac{y}{x}$$

$$3. f(x, y) = y^2 - x^2$$

$$6. f(x, y) = e^{\frac{x}{y}}$$

### 4) Qutb koordinatasida grafik yasang.

$$1. \rho = 2 \sin \varphi$$

$$3. \rho = 2(\cos \varphi - \sin \varphi)$$

$$5. \rho = 2 - \sin 4\varphi$$

$$2. \rho = \frac{\pi}{\varphi}$$

$$4. \rho = \frac{15}{3 - 4 \sin \varphi}$$

$$6. \rho = 2 \sin^3 \frac{\varphi}{3}$$

### 4-topshiriq

#### 1) Limitlarni hisoblang

$$1. \lim_{x \rightarrow \frac{\pi}{4}} \frac{1 - \operatorname{tg} x}{\cos 2x}$$

$$11. \lim_{x \rightarrow 2} \frac{\arcsin(2-x)}{\sqrt{x^3 - 3x + 2}}$$

$$2. \lim_{x \rightarrow 0} \frac{e^x + e^{-x} - 2}{x - \sin x}$$

$$12. \lim_{x \rightarrow 1} \frac{\sqrt{2x - x^4} - \sqrt[3]{x}}{1 - \sqrt[4]{x^3}}$$

$$3. \lim_{x \rightarrow \infty} \frac{3x^3 - 5x^2 + 3x - 1}{2x^3 + 3}$$

$$13. \lim_{x \rightarrow 1} \left( \frac{1}{x-1} - \frac{1}{\ln x} \right)$$

$$4. \lim_{x \rightarrow \frac{\pi}{4}} \frac{\sin 2x - \cos 2x - 1}{\sin x - \cos x}$$

$$14. \lim_{x \rightarrow \frac{\pi}{2}} \left( \operatorname{tg} x - \frac{1}{1 - \sin x} \right)$$

$$5. \lim_{x \rightarrow 4} \frac{x^2 - 16}{x^2 - 6x + 6}$$

$$15. \lim_{x \rightarrow \frac{\pi}{4}} (1 - \operatorname{tg} x) \operatorname{tg} 2x$$

$$6. \lim_{x \rightarrow \frac{\pi}{2}} \frac{\ln \sin x}{\pi - 2x}$$

$$16. \lim_{x \rightarrow \infty} \left( \frac{\pi}{2} - \operatorname{arctg} x \right)^{\frac{1}{x}}$$

$$7. \lim_{x \rightarrow 0} \frac{x - \sin x}{\sin^3 x}$$

$$17. \lim_{x \rightarrow 0} (\operatorname{ctg} x)^{\frac{x}{\ln x}}$$

$$8. \lim_{x \rightarrow \frac{\pi}{4}} \frac{\sin^2 x - \frac{1}{2} \operatorname{tg} x}{1 + \cos 4x}$$

$$18. \lim_{x \rightarrow 3} \arcsin \frac{x-3}{3} \cdot \operatorname{ctg} (x-3)$$

$$9. \lim_{x \rightarrow 3} \frac{\ln(x^2 - 8)}{x^2 + 2x - 15}$$

$$19. \lim_{x \rightarrow +\infty} \frac{4e^{5x} + 6e^{7x} - x^2 + \ln x}{5e^{7x} + 3e^{4x} - \sqrt{\ln^5 x}}$$

$$10. \lim_{x \rightarrow 0} \frac{e^x - e^{\sin x}}{x - \sin x}$$

$$20. \lim_{x \rightarrow +\infty} \frac{3e^{0,01x} + x^{100} - 1}{4e^{0,01x} - x^{50} + \ln x}$$

#### 2) Ixtiyoriy nuqtada funksiya hosilasini toping.

$$1. y = \ln(\sqrt{1+x^2} + x)$$

$$3. y = (1 + \sqrt[3]{x})^3$$

$$5. y = \frac{2 \cos x}{\sqrt{\cos 2x}}$$

$$2. y = \ln \operatorname{tg} \frac{x}{2}$$

$$4. y = \frac{2 \cos x}{\sqrt{\cos^2 x}}$$

$$6. y = e^x \sin x \cos^3 x$$

#### 3) Yuqori tartibli hosilani hisoblang

$$1. y = \ln(\sqrt{1+x^2} + x); d^2 y = ?$$

$$4. y = \sqrt{1+x^4} + \ln x; d^3 y = ?$$

$$2. y = \sin^2 x; d^3 y = ?$$

$$5. y = e^{\sin^2 x}; d^3 y = ?$$

$$3. y = \ln(\sqrt{1+x^2} + x); d^2y = ?$$

$$6. y = \lg(\sin x + x); d^2y = ?$$

#### 4) Xususiy hosilani hisoblang

$$1. f = (5x^2y - y^3 + 7)^3; \frac{\partial f}{\partial x} = ? \frac{\partial f}{\partial y} = ?.$$

$$4. f = x^{3+y} + y^{3+x}; \frac{\partial f}{\partial x} = ? \frac{\partial f}{\partial y} = ?.$$

$$2. f = \ln(x + \sqrt{x^2 + y^2}); \frac{\partial f}{\partial x} = ? \frac{\partial f}{\partial y} = ?.$$

$$5. f = \ln(x + \ln y); \frac{\partial f}{\partial x} = ? \frac{\partial f}{\partial y} = ?.$$

$$3. f = \arcsin \sqrt{\sin x^3}; \frac{\partial f}{\partial x} = ? \frac{\partial f}{\partial y} = ?.$$

$$6. f = \arcsin \frac{\sqrt{x^2 - y^2}}{\sqrt{x^2 + y^2}}; \frac{\partial f}{\partial x} = ? \frac{\partial f}{\partial y} = ?.$$

### 5-topshiriq

#### 1) Aniqmas integralni hisoblang

$$1. \int 10^x dx$$

$$6. \int \frac{\cos 2x dx}{1 + \sin x \cos x}$$

$$2. \int a^x e^x dx$$

$$7. \int \frac{x \operatorname{arctg} x}{\sqrt{1+x^2}} dx$$

$$3. \int \frac{1 + \cos^2 x}{1 + \cos 2x} dx$$

$$8. \int x^2 \ln(1+x) dx$$

$$4. \int \frac{x^2 dx}{x^6 + 4}$$

$$9. \int e^{3x} (\sin 2x - \cos 2x) dx$$

$$5. \int \frac{dx}{(a-x)(b-x)}$$

$$10. \int \frac{dx}{\sqrt{9x^2 - 6x + 6}}$$

#### 2) Aniq integralni hisoblang.

$$1. \int_1^2 \left( 2x - \frac{1}{x} - \frac{1}{x^2} \right) dx$$

$$5. \int_1^5 \frac{xdx}{\sqrt{4x+5}}$$

$$9. \int_1^{\sqrt{3}} x^{3.5} \sqrt{x^2 - 1} dx$$

$$2. \int_4^9 \left( \frac{\sqrt{x+1}}{\sqrt{x}} \right)^2 dx$$

$$6. \int_0^{100\pi} \sqrt{1 - \cos 2x} dx$$

$$10. \int_1^{\sqrt{3}} \frac{dx}{\sqrt{1+x^2}}$$

$$3. \int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \sin \frac{x}{2} \cos \frac{x}{2} dx$$

$$7. \int_{\frac{\pi}{6}}^{\frac{\pi}{4}} \frac{dx}{\cos^2 x}$$

$$4. \int_{-1}^1 \frac{xdx}{x^2 + x + 1}$$

$$8. \int_{-\frac{1}{2}}^{\frac{\sqrt{3}}{2}} \frac{dx}{\sqrt{1-x^2}}$$

#### 3) Funksiya grafigi bilan chegaralangan figura yuzasini toping.

##### Shu figurani yasang.

$$1. y = x^2 - 2x + 2, y = 2 + 4x - x^2$$

$$6. y = x^2, y = \frac{x^2}{x-2}, y = 0, x = 4$$

$$2. y = \sin x, y = \cos x, x = 0, x = 2\pi$$

$$7. y = \sqrt{x}, y = \sqrt{4-3x}, y = 0$$

$$3. y = x^3, y = x^{\frac{1}{3}}, x = 0, x = 1$$

$$8. y = -x^2, y = 2e^x, x = 0, x = 1$$

$$4. y = \operatorname{tg} x, y = \frac{2}{3} \cos x, x \in \left[ 0, \frac{\pi}{2} \right), x = 0$$

$$9. y = x - 2, y = x^2 - 4x + 2$$

$$5. y = 6x^2 - 5x + 1, y = \cos \pi x, x = 0, x = 1$$

$$10. y = \sin x, y = 2 \sin x, x = \frac{5\pi}{4}, x = 0$$

#### 4) Karrali integrallarni hisoblang

- $\int_0^1 dx \int_0^2 (x+y^2) dy$
- $\int_0^a dx \int_0^x dy \int_0^{xy} x^3 y^3 z dz$
- $\int_0^b dy \int_0^c (x+y+y) dz$
- $\iint_D xy dx dy; (0 \leq x \leq 1, 0 \leq y \leq 2)$ .
- $\iint_D e^{x+y} dx dy; (0 \leq x \leq 1, 0 \leq y \leq 1)$ .
- $\iint_D x \sin(x+y) dx dy; (0 \leq x \leq \pi, 0 \leq y \leq \frac{\pi}{2})$ .

#### 6-topshiriq

##### 1) Hisoblang

- $S = \sum_{i=1}^5 i^2 + \prod_{k=1}^6 k!$
- $P = \prod_{j=1}^{10} (j+1) + \sum_{i=1}^5 i^2 + \prod_{k=1}^6 k!$
- $S = \prod_{k=1}^5 \frac{k+1}{k!}$
- $S = \sum_{i=1}^5 i^2 + \prod_{k=1}^6 \sum_{j=1}^5 (k+j)^2$
- $S = \sum_{i=1}^5 \prod_{j=1}^7 \frac{i!+j!}{3} + \prod_{k=1}^6 k!$
- $S = \sum_{i=1}^5 \prod_{j=1}^6 (2i+j) + \prod_{k=1}^6 \sum_{t=1}^5 (i+t)^3$
- $P = \prod_{j=1}^{10} \frac{j+1}{j!} + \sum_{i=1}^5 \frac{i+1}{i!} + \prod_{k=1}^6 k!$
- $S = \prod_{k=1}^5 \sum_{k=1}^5 \prod_{j=1}^3 \frac{i+k+j}{5}$
- $S = \frac{\sum_{i=1}^5 i!}{\prod_{k=1}^5 (k+1)} + \prod_{j=1}^5 j!$
- $S = \sum_{i=1}^5 \prod_{j=1}^7 \frac{i!+j!}{3} + \sum_{t=1}^5 \frac{1}{t} + \prod_{k=1}^6 k!$

##### 2) Quyidagi qatorlar yaqinlashuvchi funksiyalarni toping

- $\sum_{n=1}^{\infty} \frac{1}{n^2 - 4n + 5}$
- $\sum_{n=1}^{\infty} \left( \frac{1+n^2}{1+n^3} \right)^2$
- $\sum_{n=1}^{\infty} \frac{1}{\sqrt{n^2 + 2n}}$
- $\sum_{n=1}^{\infty} \frac{2n+1}{n^2(n+1)^2}$
- $\sum_{n=1}^{\infty} \frac{\ln n}{\sqrt[4]{n^5}}$
- $\sum_{n=1}^{\infty} \frac{\sin nx}{2^n}$
- $\sum_{n=1}^{\infty} \frac{e^{-n^2 x^2}}{n^2}$
- $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{\ln(n+1)}$
- $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{n+1}{n}$
- $\sum_{n=1}^{\infty} (-1)^{n+1} \frac{1}{(2n-1)^3}$

#### 7-topshiriq

##### 1) Vektorlar ustida amallar bajaring

- $\vec{a} = (4; -2; -4), \vec{b} = (6; -3; 2)$  vektorlar berilgan. Quyidagini hisoblang:  
 a)  $\vec{a} \cdot \vec{b}$ ; b)  $\sqrt{a^2}$ ; c)  $\sqrt{b^2}$ ; d)  $(2\vec{a} - 3\vec{b}) \cdot (\vec{a} + 2\vec{b})$ ; e)  $(\vec{a} + \vec{b})^2$ ; f)  $(\vec{a} - \vec{b})^2$
- $\vec{a} = (2; -4; 4), \vec{b} = (-3; 2; 6)$  vektorlar tashkil etgan burchak kosinusini toping.
- $|\vec{a}| = 10; |\vec{b}| = 2$  va  $\vec{a} \cdot \vec{b} = 12$  berilgan bo'lsa,  $|\vec{a} \times \vec{b}|$  ni toping.

4.  $\vec{a} = (1;1;1)$ ,  $\vec{b} = (1;-1;1)$ ,  $\vec{c} = (1;2;3)$  vektorlar uzunligini toping.

5.  $\vec{a} = (1;0;1)$ ,  $\vec{b} = (1;2;3)$  vektorlar orasidagi burchakni toping.

## 2) Matrisalar ustida amallar bajaring

1.  $A = \begin{pmatrix} 1 & 2 & 0 \\ 0 & 1 & 1 \\ 1 & 1 & 0 \end{pmatrix}$  matrisaga teskari matrisani toping.

2.  $A = \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 2 \\ 1 & 1 & 10 \end{pmatrix}$  va  $B = \begin{pmatrix} 2 & 0 & 0 \\ 0 & 3 & 2 \\ 2 & 1 & -1 \end{pmatrix}$  matrisalar berilgan.  $B \cdot A$  ni toping.

3.  $A = \begin{vmatrix} a^2 & 1 & c^2 \\ a & b & c \\ 1 & b^2 & 1 \end{vmatrix}$  determinantini toping.

4.  $A = \begin{pmatrix} 0 & -a & -b & -d \\ a & 0 & -c & -e \\ b & c & 0 & 0 \\ d & e & 0 & 0 \end{pmatrix}$  matrisa rangini hisoblang.

5.  $A = \begin{pmatrix} 1 & 2 & 3 \\ 0 & 1 & 0 \\ 1 & 3 & 1 \end{pmatrix}$  va  $B = \begin{pmatrix} 1 & 1 & 2 \\ 2 & 1 & 1 \\ 1 & 3 & 1 \end{pmatrix}$  berilgan.  $B \cdot A$  va  $A \cdot B$  larni toping

## 8-topshiriq

### 1) Differensial tenglamalarni yeching

1.  $xy' - 2x^2\sqrt{y} = 4y;$

4.  $y'' + y' - xy^2 = 0, y(0) = 2, y'(0) = 1.$

2.  $\frac{dy}{dx} + \frac{y}{x} = -xy^2;$

5.  $xy' - \frac{y}{x+1} = x, y(1) = 0;$

3.  $y'' + y = \frac{1}{\sin x};$

6.  $y' - y \operatorname{tg} x = \sec x, y(0) = 0;$

### 2) Differensial tenglamalar sistemasini yeching

1.  $\begin{cases} \frac{dx}{dt} = x - 3y, \\ \frac{dy}{dt} = 3x + y. \end{cases}$

4.  $\begin{cases} \frac{dy}{dx} = y + 5z, \\ \frac{dz}{dx} = -y - 3z. \end{cases}$

2.  $\begin{cases} \frac{dx}{dt} = 2x + y, \\ \frac{dy}{dt} = 3x + 4y. \end{cases}$

5.  $\begin{cases} \frac{dy}{dx} = \frac{y^2 - yz}{x^2 - yz}, y(0) = 1, \\ \frac{dz}{dx} = \frac{z(x+y)}{x^2 - yz}, z(0) = -1. \end{cases}$

$$3. \begin{cases} \frac{dx}{dt} = x - y + z, \\ \frac{dy}{dt} = x + y - z, \\ \frac{dz}{dt} = 2x - y. \end{cases}$$

$$6. \begin{cases} \frac{dx}{dt} - y - z = 0, \\ -x + \frac{dy}{dt} - z = 0, \\ -x - y + \frac{dz}{dt} = 0. \end{cases}$$

### 3) Bajaring

1.  $yy'' + y' + y = 0$  ;  $y(0) = 1$ ,  $y'(0) = 0$  differensial tenglamani 7-tartibli darajali ko'rinishida yechimini toping va grafigini chizing.

2. Differensial tenglamalar sistemasi Koshi masalasining yechimi grafigini

$$\text{yasang: } \begin{cases} \frac{dx}{dt} = 2y \cos t - x - t, x(0) = 1 \\ \frac{dy}{dt} = x, y(0) = 2 \end{cases}.$$

3.  $y'' = x \sin y'$  ;  $y(1) = 0$ ,  $y'(1) = \frac{\pi}{2}$  differensial tenglamani 6- tartibli darajali ko'rinishida yechimini toping va grafigini chizing

4. Differensial tenglamalar sistemasi Koshi masalasining yechimi grafigini yasang:  $x'(t) = 2y(t) \sin(t) - x(t) - t$ ,  $y'(t) = x(t)$ ,  $x(0) = 1$ ,  $y(0) = 2$ .

5. Koshi masalasining sonli va 6-tartibli darajali qator ko'rinishida taqribiy yechimini toping:  $y'' - x \sin(y) = \sin 2x$ ,  $y(0) = 0$ ,  $y'(0) = 1$ .

### 9-topshiriq

#### 1) Funksiyaning monoton oralig'ini toping

- |  |                            |
|--|----------------------------|
| 1. $y = 2x(x - 2)^5$                     | 4. $y = x - 2 \sin x$      |
| 2. $y = \frac{1 - x + x^2}{1 + x + x^2}$ | 5. $y = x + \cos x$        |
| 3. $y = x - e^x$                         | 6. $y = x \sqrt{ax - x^2}$ |

#### 2) Funksiyaning eng katta va eng kichik qiymatlarini toping.

- |  |   |
|--|---|
| 1. $y = x^4 - 2x^2 + 5$ ; $[-2, 2]$ .                          | 4. $y = \sin 2x - x$ ; $(-\frac{\pi}{2} \leq x \leq \frac{\pi}{2})$ |
| 2. $y = \frac{1 - x + x^2}{1 + x + x^2}$ ; $(0 \leq x \leq 8)$ | 5. $y = \arctg \frac{1 - x}{1 + x}$ ; $(0 \leq x \leq 1)$           |
| 3. $y = \frac{x - 1}{x + 1}$ ; $(0 \leq x \leq 4)$             | 6. $y = 2tgx - tg^2 x$ ; $(0 \leq x \leq \frac{\pi}{2})$            |

#### 3) Funksiyaning ekstremumlarini toping

- |                                |  |
|--------------------------------|--|
| 1. $y = 2x^3 - 3x$ ].          | 4. $y = x \sin x + \cos x$             |
| 2. $y = 2x^3 - 6x^2 - 18x + 7$ | 5. $y = x^{\frac{1}{x}}$               |
| 3. $y = x - \ln(1 + x)$ .      | 6. $y = x + \frac{a^2}{x}$ ; $(a > 0)$ |

#### 4) Funksiyani to'liq tekshiring va grafigini chizing

1.  $y = \frac{x}{1+x^2}$

4.  $y = x + \cos x$

2.  $y = x^2 + \frac{1}{x^2}$

5.  $y = \left(1 + \frac{1}{x}\right)^x$

3.  $y = \cos x - \ln \cos x.$

6.  $y = x - 2\arctg x$

#### 5) Funksiyalarni 6-hadgacha darajali qatorga yoying

1.  $f(x) = \operatorname{tg} x$

2.  $f(x) = e^{2x-x^2}$

3.  $f(x) = \ln \cos x$

4.  $y = \sin(\sin x)$

5.  $y = \ln(1 + e^x)$

6.  $f(x) = e^{\cos x}$

### 3-mustaqil ish

Mavzu. Mathcad dasturida ishlash.

#### 1-topshiriq

Quyidagilarni Mathcadda hisoblang:

1.  $\sin\left[\frac{1}{2}\arctg\left(-\frac{3}{4}\right)\right]$

3.  $\cos\left(3\arg\sin\frac{\sqrt{3}}{3} - \arccos\left(-\frac{1}{2}\right)\right)$

2.  $\sin\left[\frac{1}{2}\arcsin\left(-\frac{2\sqrt{2}}{3}\right)\right]$

4.  $\arctg(3+2\sqrt{2}) - \arctg\frac{\sqrt{2}}{2}$

5. 15, 25, 35, 125 sonlarining eng katta umumiy bo'luvchisini toping

6. 34 va 12 sonlarining butun bo'linishi va qoldig'ini toping.

7.  $\frac{12}{5}$  va  $\frac{37}{18}$  kasr sonlarining butun va kasr qismlarini ajrating.

8.  $\frac{12}{5}$  va  $\frac{37}{18}$  kasrlarni yaxlitlang.

#### 2-topshiriq

Quyidagilarni yeching:

1.  $x = \cos(x)$

5.  $e^x = x^2 + 5$

2.  $x^3 + \sin x = 25$

6.  $x = \sin^2 x + 7$

3. 
$$\begin{cases} 2x - y = 2 \\ 3x - y = 5 \end{cases}$$

7. 
$$\begin{cases} \frac{x}{3} - \frac{y}{2} = 1 \\ \frac{x}{6} + \frac{y}{8} = 2 \end{cases}$$

4.  $\frac{x+1}{x-2} > \frac{3}{x-2} - \frac{1}{2}$

8.  $\frac{3x^2 - 10x + 3}{x^2 - 10x + 25} > 0$

#### 3-topshiriq

1. Mathcad nuhitida quyidagilarni bajaring:

1.  $S = \sum_{i=1}^5 i^2 + \prod_{k=1}^6 k!$

2.  $S = \sum_{i=1}^5 \prod_{j=1}^6 (2i+j) + \prod_{k=1}^6 \sum_{t=1}^5 (i+t)^3$

$$3. \lim_{x \rightarrow \frac{\pi}{4}} \frac{1 - \operatorname{tg} x}{\cos 2x}$$

$$4. \lim_{x \rightarrow 2} \frac{\arcsin(2-x)}{\sqrt{x^3 - 3x + 2}}$$

$$5. y = \ln(\sqrt{1+x^2} + x); d^2y = ?$$

$$6. y = \sqrt{1+x^4} + \ln x; d^3y = ?$$

2.. Quyidagilarni Mathcad muhitida hisoblang:

$$1. \int 10^x dx$$

$$2. \int \frac{\cos 2x dx}{1 + \sin x \cos x}$$

$$3. \int_1^2 \left( 2x - \frac{1}{x} - \frac{1}{x^2} \right) dx$$

$$4. \int_1^5 \frac{xdx}{\sqrt{4x+5}}$$

$$5. \int_0^1 dx \int_0^2 (x+y^2) dy$$

$$6. \iint_D xy dx dy; (0 \leq x \leq 1, 0 \leq y \leq 2).$$

#### 4-topshiriq

##### 1) Funksiya grafigini yasang

$$1. y = x^2 + \sin x$$

$$2. y = \sqrt{4-3x}$$

##### 2) Bitta argumentga bog'liq ikkita funktsiya grafigini chizing.

$$1. y = \ln(x+6), y = 3 \ln x$$

$$2. y = \sqrt{x}, y = \sqrt{4-3x}$$

##### 3) Sirt grafigini chizing.

$$1. f(x, y) = \frac{x^2}{4} - \frac{y^2}{9}$$

$$2. f(x, y) = \ln(x^2 + y^2)$$

#### 5-topshiriq

##### 1) Differensial tenglamalarni yeching

$$1. y' + 2y = 4x;$$

$$2. y'' + 2y + y = \frac{1}{x} e^{-x};$$

##### 2) Differensial tenglamalar sistemasini yeching

$$1. \begin{cases} \frac{dx}{dt} = y - 7x, \\ \frac{dy}{dt} + 2x + 5y = 0. \end{cases}$$

$$2. \begin{cases} \frac{dx}{dt} = 1 - \frac{2x}{t}, x(1) = \frac{1}{3} \\ \frac{dy}{dt} = x + y - 1 + \frac{2x}{t}, y(1) = -\frac{1}{3} \end{cases}$$

3).  $yy'' + y' + y = 0$ ;  $y(0) = 1$ ,  $y'(0) = 0$  differensial tenglamani 7-tartibli darajali qator ko'rinishida yechimini toping va grafigini chizing.

## **“Amaliy dasturlar majmuasi” fanidan referat mavzulari**

- 1-mavzu. Excelda ifodalar qiymatini hisoblash..
- 2-mavzu. MS Excel da tenglamalar sistemasini sonli va grafik usullarda yechish
- 3-mavzu. MS Excel yordamida sonli algebra masalalarini yechish.
- 4-mavzu. Maple muhitida funksiyalar va ular bilan ishlash.
- 5-mavzu. Mapleda tenglama va tenglamalar sistemasini yechish.
- 6-mavzu. Tengsizlik va tengsizliklar sistemasini yechish.
- 7-mavzu. Mapleda funksiyalar grafigini yasash.
- 8-mavzu. Mapleda limitlarni hisoblash .
- 9-mavzu. Mapleda differensiallash.
- 10-mavzu. Mapleda funksiyalarni tekshirish.
- 11-mavzu. Mapleda integrallash.
- 12-mavzu. Mapleda qator yig'indisi va ko'paytmasini hisoblash.
- 13-mavzu. Mapleda vektorlar ustida amallar.
- 14-mavzu. Mapleda differensial tenglamalarni yechish.
- 15-mavzu. Mapleda funksiyalarni darajali qatorga yoyish.
- 16-mavzu. Maple muhitida ikki o'lchovli grafika.
- 17-mavzu. Maple muhitida uch o'lchovli grafika.
- 18-mavzu. Maple muxitining asosiy menyusi va u bilan ishlash.
- 19-mavzu. Maple muhitida ko'phadlar bilan ishlash.
- 20-mavzu. Mathcad dasturining asosiy vositalari va ulardan foydalanish .
- 21-mavzu. Mathcad dasturida ishlash asoslari va imkoniyatlari.
- 22-mavzu. Komputer grafikasi va uning asosiy tushunchalari.
- 23-mavzu. Mathcadda matrisalar ustida amallar.
- 24-mavzu. . Mathcadda differensial tenglamalar sistemasini yechish.
- 25-mavzu. Excelda tenglama va tengsizliklar sistemasini grafik usulda yechish.
- 26-mavzu. Mathcadda differensial tenglamalar sistemasini grafik usulda yechish.
- 27-mavzu. Mathcad muhitida hosila va xususiy hosilalarni hisoblash.
- 28-mavzu. . Mathcad muhitida karali integrallarni hisoblash.
- 29-mavzu. . Excelda qatorlar yig'indisi va ko'paytmasini hisoblash..
- 30-mavzu. . Mathcad muhitida matematik va butun sonli funksiyalar bilan ishlash.

## Foydalanish uchun adabiyotlar

1. Дяконов В.П. Maple 6: учебный курс. СПб.: Питер, 2001.
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**«Amaliy dasturlar majmuasi» fanidan mustaqil  
mashg'ulot topshriqlari**

**Uslubiy qo'llanma**

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