MAPLE DASTURIDA FUNKSIYALARNING GRAFIKLARINI CHIZISH

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Annotatsiya: Mazkur tezisda matematikada uchraydigan funksiyalarning grafiklarini Maple dasturidan foydalanib, qanday buyruqlar yordamida chizish mumkinligi haqida so‘z boradi. Ushbu buyruqlani qo‘llash haqida qisqacha tushuncha berilgan hamda ayrim qiziqarli funksiyalarning grafiklari amalda chizib ko‘rsatilgan.

Kalit so’zlar: Maple, plot buyrug‘i, implicitplot buyrug‘i, inequals buyrug‘i, parametr.

Maple dasturi yordamida oshkor, parametrik, oshkormas ko‘rinishda berilgan bir va ikki o‘zgaruvchili funksiyalarning grafiklarini juda chiroyli chizish mumkin [1]-[5]. Oddiy va xususiy hosilali differensial tenglamalarda uchraydigan chegaraviy masalalarni ham ushbu dasturda hal qilish imkoniyati bor [5]-[10]. $f(x)$ oshkor funksiyani Ox o‘qining $a \le x \le b$ kesmasida va Oy o‘qining $c \le y \le d$ kesmasida grafigini chizish uchun **plot(f(x),x=a..b,y=c..d,parametrs)** komandasi ishlatiladi, bu yerda parametrs – tasvirni boshqarish uchun ishlatiladigan parametrlar. Ular quyidagilardan iborat:

№	Parametr	Ma’nosi
1	title=”text”	Tasvirga nom berish, nom lotincha bo‘lsa probelsiz
2	coords=polar	Qutb koordinatlariga o‘tish, agar yozilmasa dekart koordinatlar sistemasi
3	axes=NORMAL axes=BOXED axes=FRAME axes=NONE	-oddiy o‘qlar \\ Koordinata o‘qlarini berish -shkalali o‘qlar -o‘qlarning boshi quyi chap burchakda -o‘qlar yo‘q
4	asaling=CONSTRINED asaling=UNCONSTRINED	-o‘qlarga bir xil masshtab berish - o‘qlar masshtabi oyna o‘lchamiga mos
5	style=LINE style=POINT	-chiziqlar bilan chiqarish -nuqtalar bilan chivarish
6	numpoints=n (n=49 berilmasa)	-hisoblanadigan nuqtalar soni
7	color=rang nomi (yellow,...)	-chiziqlarga rang berish
8	xticmarks=nx, yticmarks=ny	Ox va Oy o‘qlarda nuqtalar sonini berish
9	thickness=n, n=1,2,…	-chiziq qalinligini berish
10	linestyle=n (n=1-uzluksiz)	-chiziq tipini berish, uzluksiz, punktir
11	symbol=s (BOX, CROSS, CIRCLE, POINT, DIAMOND)	- nuqtani beradigan simvol tipini berish
12	font=[f,style, size]	matn shrifti tipini berish, f-shrift nomi: TIMES, COURIER, HELVITICA, SYMBOL; style- shrift stili: BOLD, ITALIC, UNDERLINE; size-shrift o‘lchami
13	Labels=[tx,ty]	Ox ga tx, Oy ga ty deb yozishga ruxsat berish
14	**discont=true**	Cheksiz uzilishlarni tasvirlashga ruxsat berish

Maple dasturida grafik yasash uchun yana quyidagi buyruqlardan ham foydalaniladi:

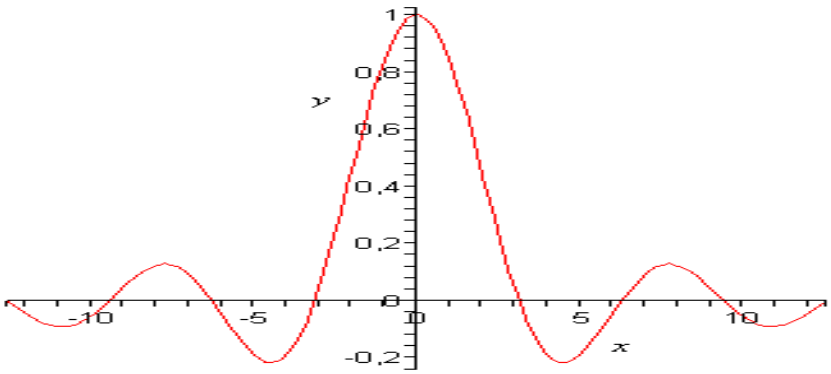
№	Buyruqlar	Grafigi chiziladigan funksiya
1	plot(f(x),x=a..b, y=c..d, parametrs)	f(x),x=a..b, y=c..d
2	plot([y=y(t),x=x(t),t=a..b], parametrs)	y=y(t),x=x(t),t=a..b
3	implicitplot(F(x,y)=0, x=x1..x2, y=y1..y2)	F(x,y)=0, x=x1..x2, y=y1..y2
4	implicitplot(F(x,y)=0,G(x,y)=0, x=x1..x2, y=y1..y2)	F(x,y)=0,G(x,y)=0, x=x1..x2, y=y1..y2)
5	inequal({f1(x,y)>c1,…,fn(x,y)>cn}, x=x1…x2, y=y1..y2, options).	f1(x,y)>c1,…,fn(x,y)>cn

Endi ayrim qiziqarli funksiyalarning grafiklarini chizib ko‘rsatamiz.

1. $y=\dfrac{\sin x}{x}$ funksiya grafigi $(-4\pi,4\pi)$ oraliqda chizilsin.

Berilgan funksiya grafigini ushbu buyruqni Maple dasturida yozish orqali hosil qilinadi (sinab ko‘ring):

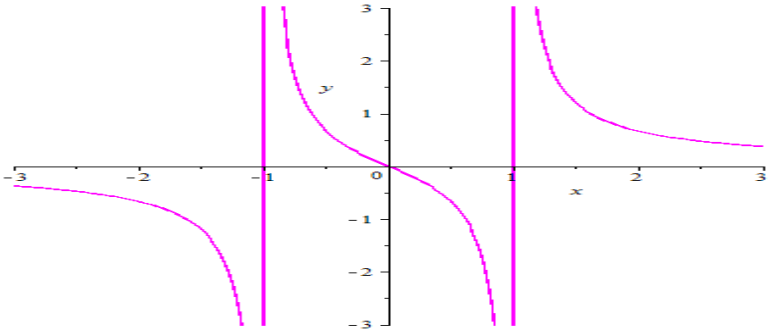
```
plot(sin(x)/x, x=-4*Pi..4*Pi, labels=[x,y], labelfont=[TIMES, ITALIC, 12]);
```



2. $y=\dfrac{x}{x^2-1}$ funksiyaning grafigi chizilsin.

Berilgan funksiya grafigini chizish uchun ushbu buyruqdan foydalanamiz:

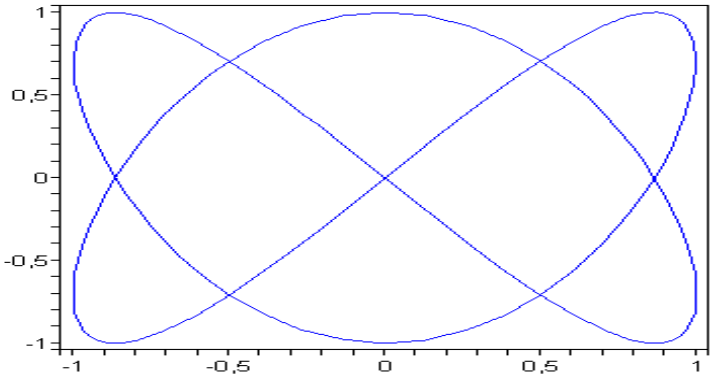
```
plot(x/(x^2-1),x=-3..3,y=-3..3,color=magenta);
```



3. Parametrik ko‘rinishda berilgan $x=\sin 2t$, $y=\cos 3t$ funksiyaning grafigini chizing.

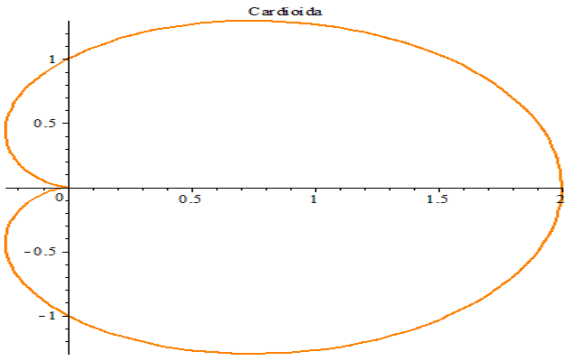
Buning uchun ushbu buyruqdan foydalanamiz:

```
plot([sin(2*t),cos(3*t),t=0..2*Pi], axes=BOXED, color=blue);
```



4. $\rho = 1 + \cos\varphi$ funksiya grafigi chizilsin.

```
plot(1+cos(x),x=0..2*Pi,title="Cardioida",coords=polar, color=coral,thickness=2);
```



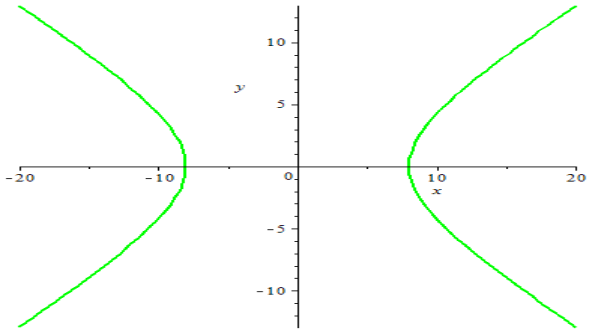
5. $y = \ln(3x-1)$, $y = \frac{3}{2}x - \ln 2$ funksiyalar grafigini bitta buyruqda mustaqil chizib ko‘ring, bunda ikkinchi funksiya grafigi nuqtali tarzda namoyon bo‘ladi.

```
plot([ln(3*x-1), 3*x/2-ln(2)],x=0..6, scaling=CONSTRAINED,
 color=[violet,gold],linestyle=[1,2],thickness=[3,2]);
```

Endi **implicitplot** hamda **inequals** buyruqlariga doir masalalarni yechamiz. Buning uchun, avval, **with(plots):** buyrug‘ini ishlatib olish kerak.

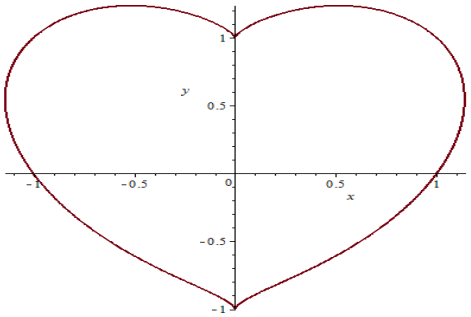
1. $\frac{x}{4} - \frac{y^2}{2} = 16$ giperbola chizilsin.

```
with(plots):
implicitplot(x^2/4-y^2/2=16, x=-20..20,   y=-16..16, color=green, thickness=2);
```



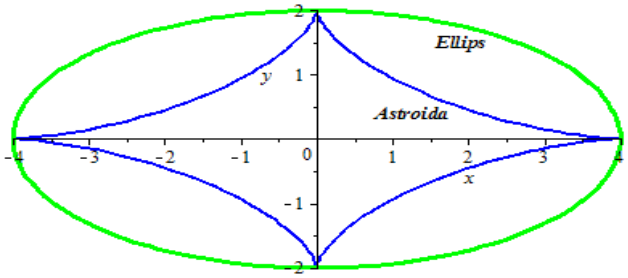
2. $\left(x^2+y^2-1\right)^3-x^2y^3=0$ funksiyaning grafigini chizing.

```
with(plots):
implicitplot((x^2+y^2-1)^3-x^2*y^3 = 0, x = -2 .. 2, y = -2 .. 2, gridrefine = 5);
```



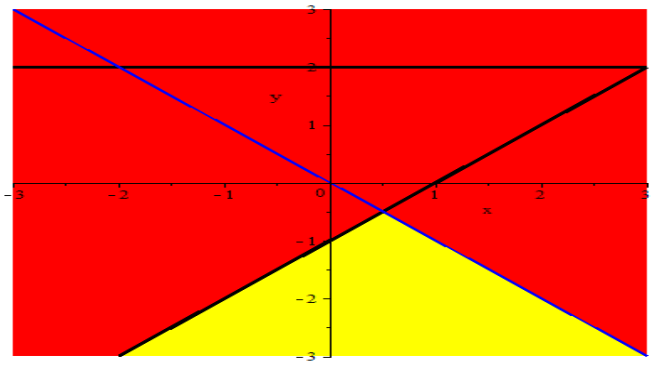
3. Astroida $x=4\cos^3 t, y=2\sin^3 t, 0\le t\le 2\pi,$ va $\frac{x}{16}+\frac{y^2}{4}=1$ ellips bitta grafikda chizilsin. Chizmalarga Astroida va Ellips deb nomlar berilsin.

```
with(plots):
eq := (1/16)*x^2+(1/4)*y^2 = 1:
el := implicitplot(eq, x = -4 .. 4, y = -2 .. 2, scaling = CONSTRAINED, color = green, thickness = 3) :
as := plot([4*cos(t)^3, 2*sin(t)^3, t = 0 .. 2*Pi], color = blue, scaling = CONSTRAINED, thickness = 2) :
eq1 := convert(eq, string) :
t1 := textplot([1.5, 2.5, eq1], font = [TIMES, ITALIC, 10], align = RIGHT) :
t2 := textplot([1.5, 1.5, Ellips], font = [TIMES, BOLD, 10], align = RIGHT) :
t3 := textplot([1.8, .4, Astroida], font = [TIMES, BOLD, 10], align = LEFT) :
display([as, el, t1, t2, t3])
```



4. $x+y>0,\ x-y\le 1,\ y=2$ soha chizilsin.

```
with(plots):
inequal({{x+y>0},{x-y<=1},{y=2}},x=-3..3,y=-3..3,optionsfeasible=(color=red), optionsopen=(color=blue,thickness=2), optionsclosed=(color=green, thickness=3),
optionsexcluded=(color=yellow) );
```



Xulosa

Maple dasturining tekislikdagi grafik imkoniyatlari haqida qisqacha aytib o‘tildi. Avval plot buyrug‘i va uning parametrlari haqida ma’lumot keltirildi. So‘ngra tekislikdagi funksiyalarning grafiklarini chizib beruvchi buyruqlar jadval ko‘rinishda berildi. Bir nechta qiziqarli funksiyalarning grafiklari chizib ko‘rsatildi. Aytib o‘tish kerakki, Maple dasturining tekislikdagi grafik imkoniyatlarini qasqa tezis ko‘rinishda to‘liq ko‘rib chiqib bo‘lmaydi. Bu dastur bizga murakkab va tasavvur qilishimiz qiyin bo‘lgan funksiyalarning grafiklarini hosil qilishimiz hamda hosil qilingan grafiklarning parametrlarini boshqarish imkonini beradi.

Foydalanilgan adabiyotlar:

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