MAVZU: BIR JINSLI DIFFERENSIAL TENGLAMALARNI YECHISHDA MAPLE AMALIY DASTURI YORDAMIDA O‘QUVCHILARNING SAVODXONLIGINI SHAKLLANTIRISH

TOSHKENT DAVLAT IQTISODIYOT UNIVERSITETI INTERNATIONAL BUSINESS AKADEMIK LITSEYI O’QITUVCHISI

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Misol. $y' = 1 + \frac{y}{x}$; ko‘rinishidagi bir jinsli differensial tenglamalarini yechishda Maple amaliy dasturi yordamida yechamiz va **y(1)=2** nuqtadan o‘tuvchi grafigini chizamiz.

Yuqoridagi tenglamaning ma’lum bir shakli uchun umumiy yechimni olish uchun avval DEtools-ni quydagi tarzda yuklaymiz

```
> with(DEtools):
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tenglamaning o‘ng tomonini tanlaymiz

```
> f:=(1+y(x)/x);
```

$$f := 1 + \frac{y(x)}{x}$$

bu o‘ng tomon bilan differensial tenglamani kiritish va yechish formulasi

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> deq:=diff(y(x),x)=f;
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$$deq := \frac{\partial}{\partial x} y(x) = 1 + \frac{y(x)}{x}$$

va dsolve buyrug'i bilan differensial tenglamani hisoblaymiz

> ***dsolve(deq,y(x));***

$$y(x) = (\ln(x) + \_C1)\, x$$

boshlang'ich shartni kirgizamiz

> ***ic:=y(1)=2;***

$$ic := y(1) = 2$$

> ***soln:=dsolve({deq,ic},y(x));***

$$soln := y(x) = (\ln(x) + 2)\, x$$

Noma'lum funksiyani kiritamiz (noma'lum funksiyani kiritish ta'lab qilinadi)

> ***phi:=rhs(soln);***

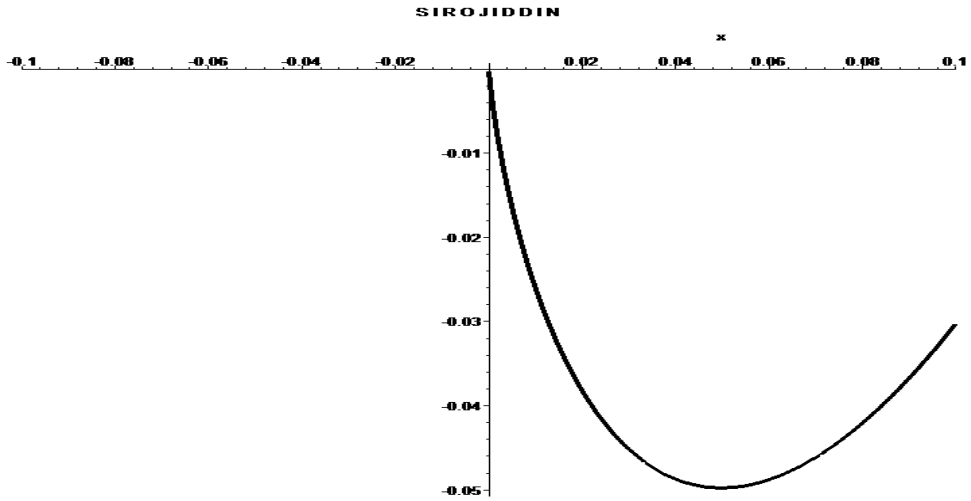
$$\phi := (\ln(x) + 2)\, x$$

> ***phi1:=subs({y(1)=2},phi);***

$$\phi 1 := (\ln(x) + 2)\, x$$

Chizma -0,1 dan 0, 1gacha masshtabda chizish va chiziq qalinligi,rangi thickress=4 buyrug'i berildi,title buyrug' bilan chizmaga sarlavha kirgizamiz,axes buyrug' bilan NORMAL buyrug'ini tanlaymiz.

> plot(phi1,x=-0.1..0.1,color=black,title="S I R O J I D D I N",thickness=4,axes=NORMAL);



Misol. $(y^2 - 2xy) + x^2y' = 0$ ko‘rinishidagi bir jinsli differensial tenglamalarini yechishda Maple amaliy dasturi yordamida yechamiz va **y(4)=1** nuqtadan o‘tuvchi grafigini chizamiz.

$ode := (y(x)^2 - 2 \cdot x \cdot y(x)) + x^2 \cdot diff(y(x), x) = 0;$

matematik ko‘rinishi

$$y(x)^2 - 2\,x\,y(x) + x^2 \left(\frac{d}{dx} y(x) \right) = 0$$

dsolve(%) buyrug’idan foydalanib tenglamani yechamiz

$dsolve(\%);$

$$y(x) = \frac{x^2}{x + \_C1}$$

$ex := y(4) = 1;$

$$y(4) = 1$$

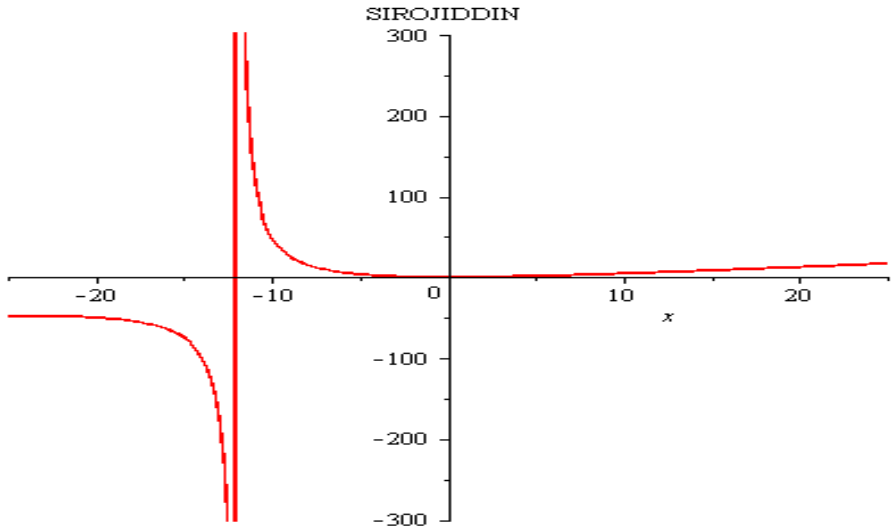
xususiy yechimni topamiz

$$dsolve(\{ode, ex\}, y(x));$$

$$y(x) = \frac{x^2}{x + 12}$$

va plot buyrug'i bilan grafikni chizamiz:

$$plot\left(\frac{x^2}{x + 12}, x = -25 ..25, color = red, title = \text{"SIROJIDDIN"}\right);$$



Misol. $y' = \frac{y \cdot (2y - x)}{x^2}$ ko'rinishidagi bir jinsli differensial tenglamalarini yechishda Maple amaliy dasturi yordamida yechamiz va **y(3)=0.5** nuqtadan o'tuvchi grafigini chizamiz.

Yuqoridagi tenglamaning ma'lum bir shakli uchun umumiy yechimni olish uchun avval DEtools-ni quydagi tarzda yuklaymiz

> ***with(DEtools):***

> ***f:=y(x)*(2*y(x)-x)/x^2;***

$$f := \frac{y(x)\,(2\,y(x) - x)}{x^2}$$

> ***deq:=diff(y(x),x)=f;***

$$deq := \frac{\partial}{\partial x} y(x) = \frac{y(x)\,(2\,y(x) - x)}{x^2}$$

> ***dsolve(deq);***

$$y(x) = \frac{x}{1 + \_C1\,x^2}$$

> ***ic:=y(3)=0.5;***

$$ic := y(3) = .5$$

> ***yechamiz:=dsolve({deq,ic},y(x));***

$$yechamiz := y(x) = \frac{x}{1 + \frac{5}{9}x^2}$$

> ***phi:=rhs(yechamiz);***

$$\phi := \frac{x}{1 + \frac{5}{9}x^2}$$

> ***phi1:=subs({y(3)=0.5},phi);***

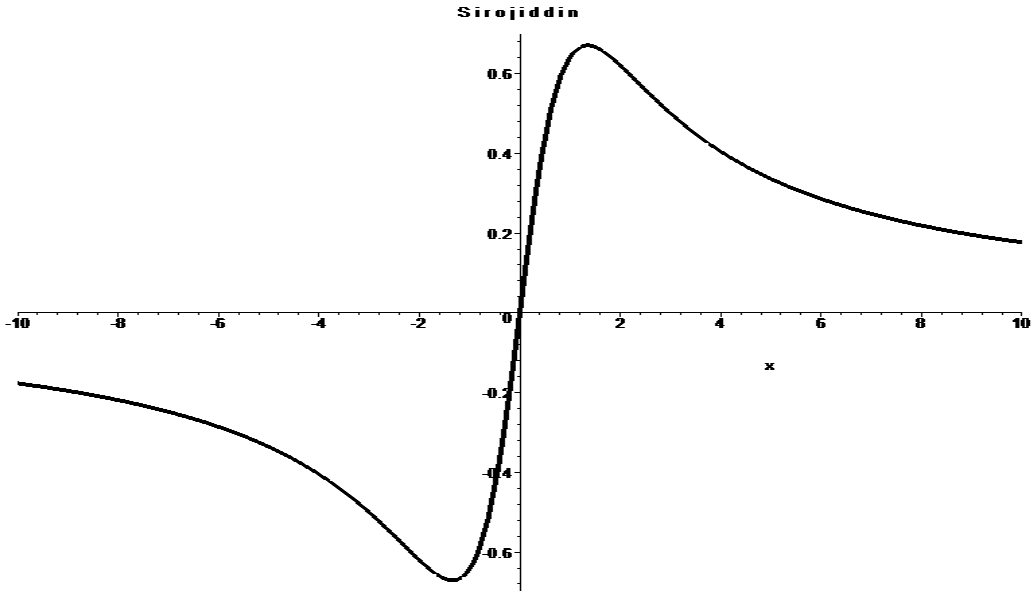
>

$$\phi 1 := \frac{x}{1 + \frac{5}{9}x^2}$$

> ***plot(phi1,x=-10..10,thickness=4,color=black,***

title="S i r o j i d d i n");

>



Misol. $y' = \frac{2y^2 - x^2}{xy}$ ko‘rinishidagi bir jinsli differensial tenglamalarini yechishda Maple amaliy dasturi yordamida yechamiz va **y(3)=0.5** nuqtadan o‘tuvchi grafigini chizamiz.

Yuqoridagi tenglamaning ma’lum bir shakli uchun umumiy yechimni olish uchun avval DEtools-ni quydagi tarzda yuklaymiz

> ***with(DEtools):***

Keling tenglamaning o‘ng tomonini tanlaymiz

> ***f:=(2*(y(x))^2-x^2)/(x*y(x));***

$$f := \frac{2\,y(x)^2 - x^2}{x\,y(x)}$$

bu o‘ng tomon bilan differensial tenglamani kiritish va yechish formulasi

> ***deq:=diff(y(x),x)=f;***

$$deq := \frac{\partial}{\partial x} y(x) = \frac{2\,y(x)^2 - x^2}{x\,y(x)}$$

yechimni olamiz

> ***dsolve(deq);***

$$y(x) = \sqrt{1 + \_C1\, x^2}\, x,\ y(x) = -\sqrt{1 + \_C1\, x^2}\, x$$

shart beramiz

> ***ic:=y(3)=0.5;***

$$ic := y(3) = .5$$

> ***yechamiz:=dsolve({deq,ic},y(x));***

$$yechamiz := y(x) = \sqrt{1 - \frac{35}{324}x^2}\, x$$

noma'lum funksiyani kiritamiz

> ***phi:=rhs(yechamiz);***

$$\phi := \sqrt{1 - \frac{35}{324}x^2}\, x$$

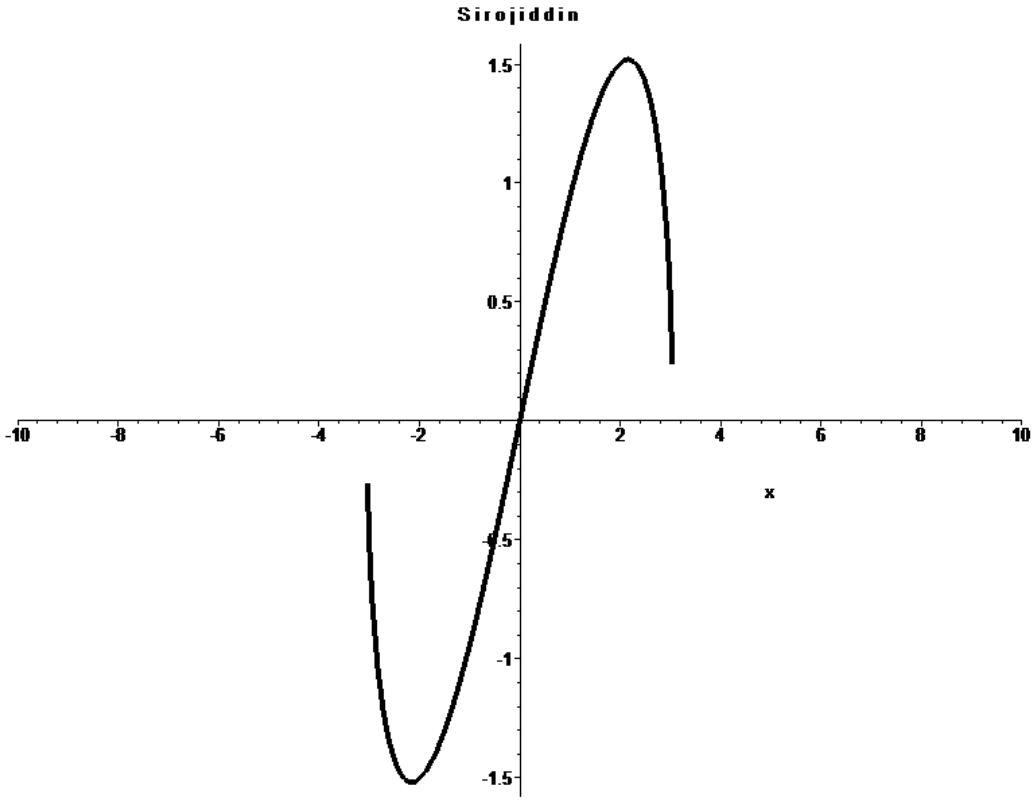
> ***phi1:=subs({y(3)=-0.5},phi);***

>

$$\phi 1 := \sqrt{1 - \frac{35}{324}x^2}\, x$$

Chizmani chizamiz,rangi,sarlavhani qo‘yamiz,chiziq qalinligini va oraliqni belgilaymiz.

> ***plot(phi1,x=-10..10,thickness=4,color=black,title="S I r o j I d d I n");***



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