

```
> restart;with(DEtools):
```

Izoklinės, kryptių laukai, integralinės kreivės:

```
> lygtis1:=diff(y(x),x)=x^2+y(x)^2;
```

$$lygtis1 := \frac{d}{dx} y(x) = x^2 + y(x)^2$$

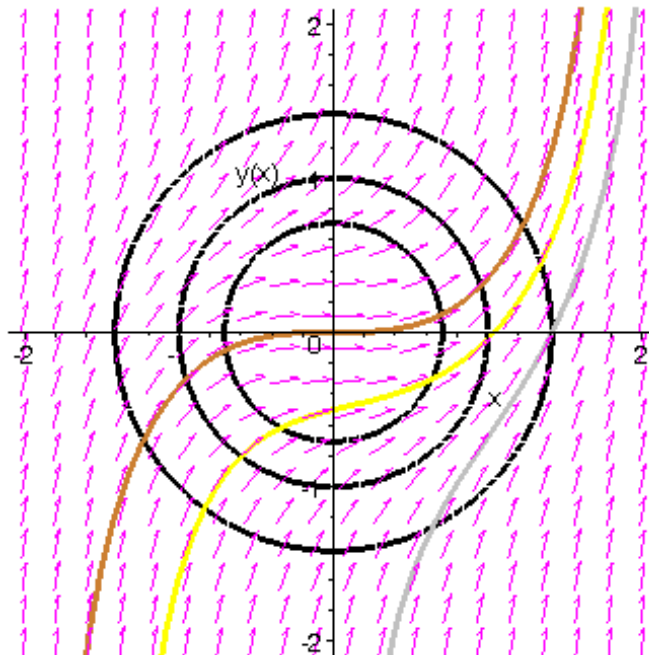
```
> dsolve(lygtis1);
```

$$y(x) = -\frac{x \left( -CI \operatorname{BesselJ}\left(\frac{-3}{4}, \frac{x^2}{2}\right) + \operatorname{BesselY}\left(\frac{-3}{4}, \frac{x^2}{2}\right) \right)}{-CI \operatorname{BesselJ}\left(\frac{1}{4}, \frac{x^2}{2}\right) + \operatorname{BesselY}\left(\frac{1}{4}, \frac{x^2}{2}\right)}$$

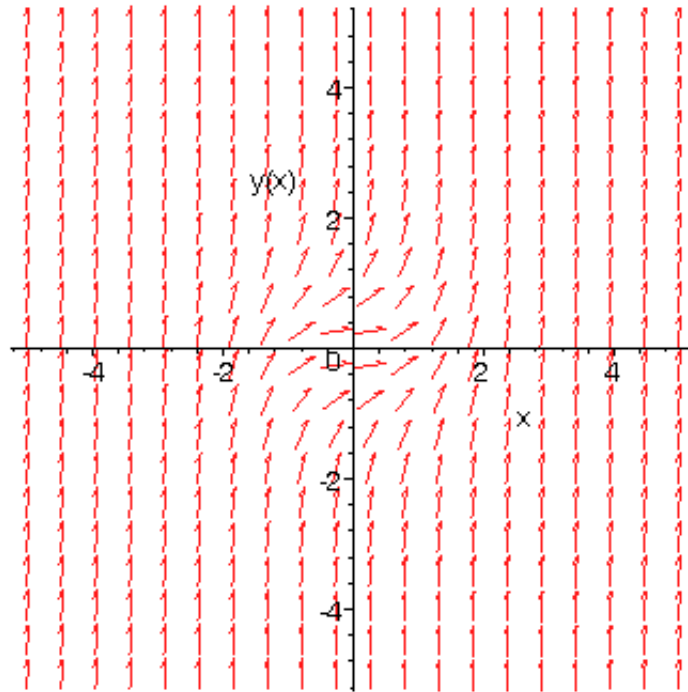
```
> p1:=phaseportrait(diff(y(x),x)=x^2+y(x)^2,y(x),x=-2..2,[y(0)=0],[y(0)=-1/2],[y(sqrt(2))=0]],y=-2..2,colour=magenta,linecolor=[gold,yellow,gray]):
```

```
> with(plots):p2:=contourplot(x^2+y^2,x=-5..5,y=-5..5,grid=[100,100],contours=[1/2,1,2],thickness=3,color=black):
```

```
> display(p1,p2);
```



```
> dfieldplot(diff(y(x),x)=x^2+y(x)^2,y(x),x=-5..5,y=-5..5);
```



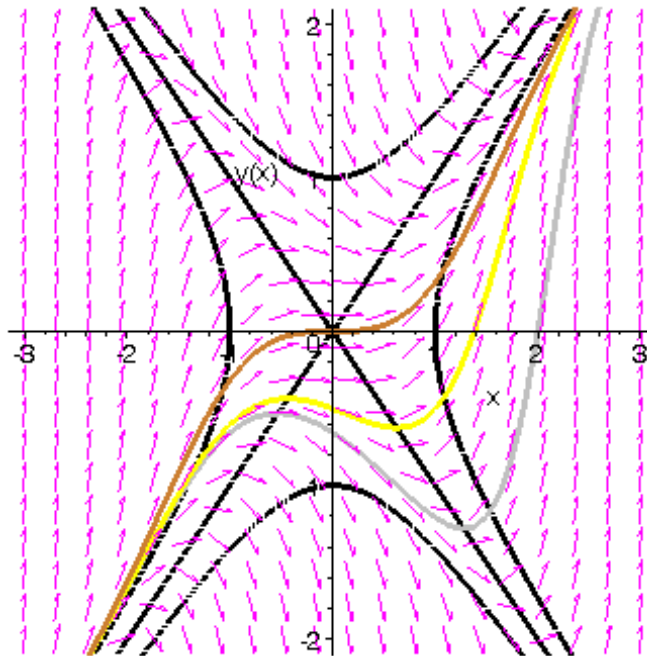
```
>
> restart;with(DEtools):
> lygtis2:=diff(y(x),x)=x^2-y(x)^2;
```

$$lygtis2 := \frac{d}{dx} y(x) = x^2 - y(x)^2$$

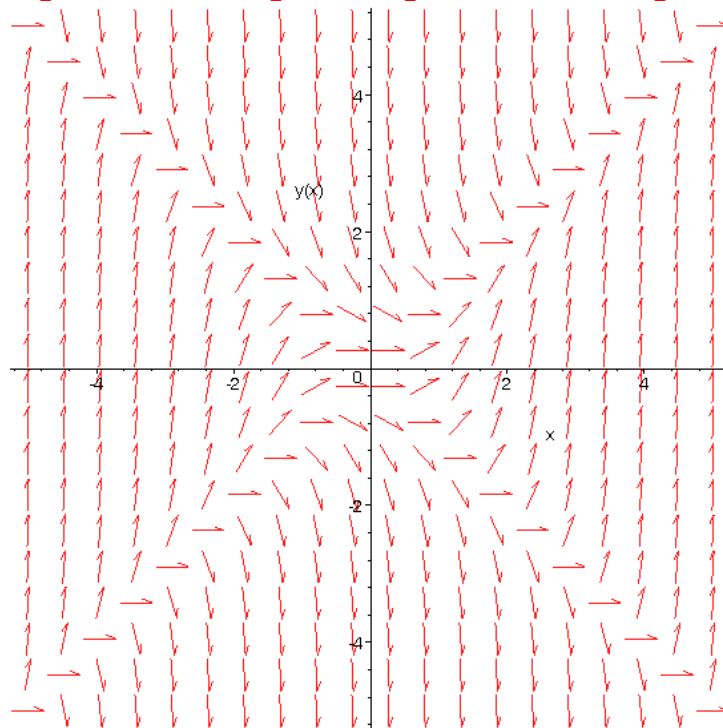
```
> dsolve(lygtis2);
```

$$y(x) = \frac{x \left( -CI \operatorname{BesselI}\left(\frac{3}{4}, \frac{x^2}{2}\right) - \operatorname{BesselK}\left(\frac{3}{4}, \frac{x^2}{2}\right) \right)}{-CI \operatorname{BesselI}\left(\frac{1}{4}, \frac{x^2}{2}\right) + \operatorname{BesselK}\left(\frac{1}{4}, \frac{x^2}{2}\right)}$$

```
> p1:=phaseportrait(lygtis2,y(x),x=-3..3,[y(0)=0],[y(0)=-1/2],[y(2)=0],y=-2..2,colour=magenta,linecolor=[gold,yellow,gray]):
> with(plots):p2:=contourplot(x^2-y^2,x=-3..3,y=-3..3,grid=[100,100],contours=[1,-1,0],thickness=3,color=black):
> display(p1,p2);
```



> `dfieldplot(diff(y(x),x)=x^2-y(x)^2,y(x),x=-5..5,y=-5..5);`



> `restart;`

Izognaliosios trajektorijos:

> `lygtis3:=diff(y(x),x)=-x/(2*y(x));`

$$lygtis3 := \frac{d}{dx} y(x) = -\frac{1}{2} \frac{x}{y(x)}$$

> `lygtis4:=diff(y(x),x)=2*y(x)/x;`

$$\text{lygtis4} := \frac{d}{dx} y(x) = \frac{2 y(x)}{x}$$

>

```
spr3:=dsolve(lygtis3);spr31:=subs(_C1=4,spr3[1]);spr32:=subs(_C1=4,spr3[2]);
```

$$\text{spr3} := y(x) = -\frac{\sqrt{-2x^2 + 4\_C1}}{2}, y(x) = \frac{\sqrt{-2x^2 + 4\_C1}}{2}$$

$$\text{spr31} := y(x) = -\frac{\sqrt{-2x^2 + 16}}{2}$$

$$\text{spr32} := y(x) = \frac{\sqrt{-2x^2 + 16}}{2}$$

```
> spr4:=dsolve(lygtis4);spr41:=subs(_C1=1,spr4);
```

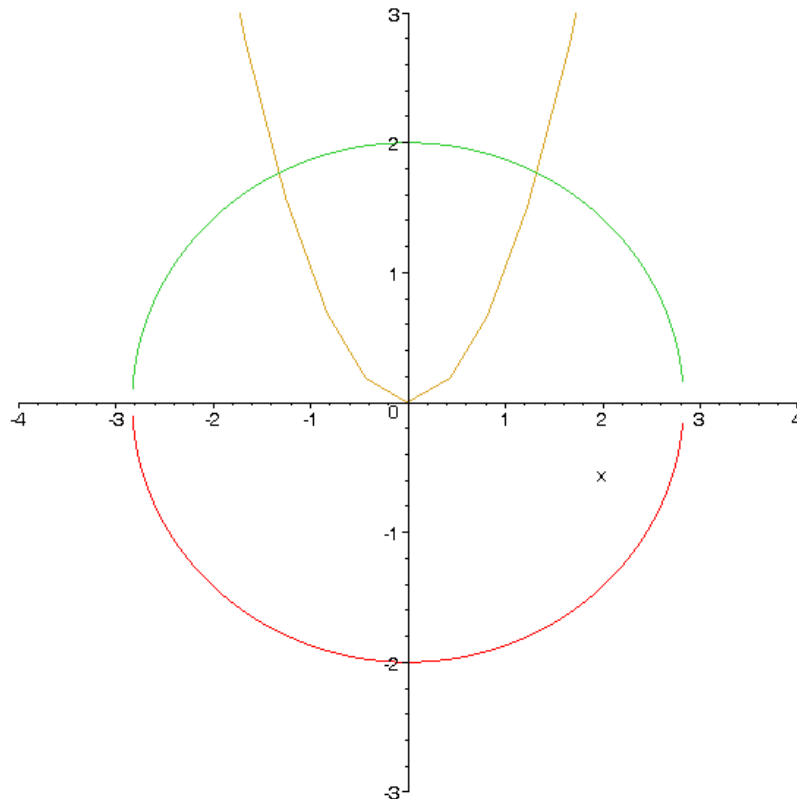
$$\text{spr4} := y(x) = x^2\_C1$$

$$\text{spr41} := y(x) = x^2$$

```
> with(plots):
```

```
> p1:=plot([rhs(spr31),rhs(spr32),rhs(spr41)]):display(p1,view=[-4..4,-3..3]);
```

>



```
> restart;
```

```
> lygtis3:=diff(y(x),x)=y(x)/(2*x);
```

$$\text{lygtis3} := \frac{d}{dx} y(x) = \frac{1}{2} \frac{y(x)}{x}$$

> **lygtis4:=diff(y(x),x)=(y(x)-2\*x)/(y(x)+2\*x);**

$$\text{lygtis4} := \frac{d}{dx} y(x) = \frac{y(x) - 2x}{y(x) + 2x}$$

> **spr3:=dsolve(lygtis3);spr31:=subs(\_C1=4,spr3);**

$$\text{spr3} := y(x) = \_C1 \sqrt{x}$$

$$\text{spr31} := y(x) = 4 \sqrt{x}$$

> **spr4:=dsolve(lygtis4);spr41:=subs(\_C1=10,spr4);**

*spr4* :=

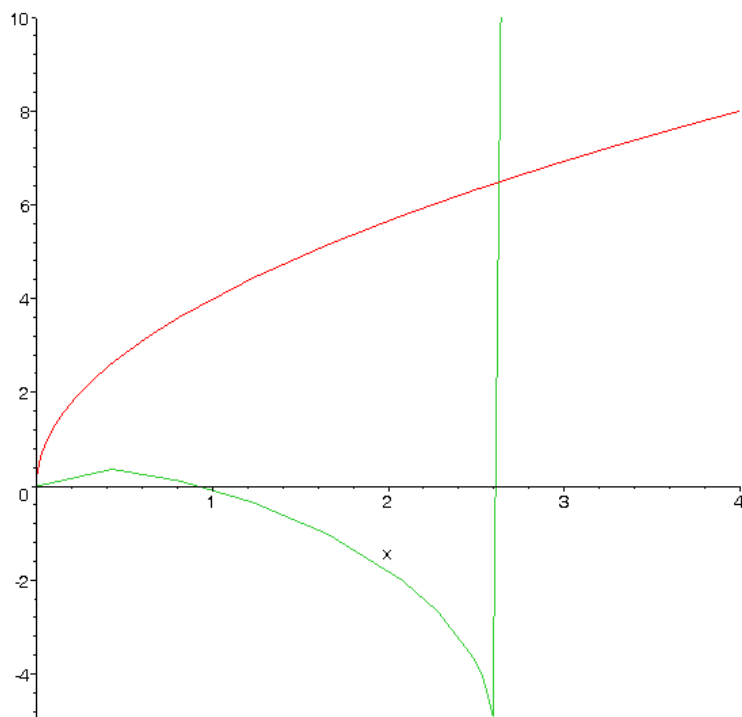
$$y(x) = \frac{1}{2} \sqrt{7} x \tan\left(\text{RootOf}\left(6 \_Z + 2 \sqrt{7} \_C1 + \sqrt{7} \ln\left(\frac{7 x^2}{4} + \frac{7}{4} \tan(\_Z)^2 x^2\right)\right)\right) - \frac{x}{2}$$

*spr41* :=

$$y(x) = \frac{1}{2} \sqrt{7} x \tan\left(\text{RootOf}\left(6 \_Z + 20 \sqrt{7} + \sqrt{7} \ln\left(\frac{7 x^2}{4} + \frac{7}{4} \tan(\_Z)^2 x^2\right)\right)\right) - \frac{x}{2}$$

> **with(plots):**

> **p1:=plot([rhs(spr31),rhs(spr41)]):display(p1,view=[0..4,-5..10]);**



>