[5] TIESINĖ PIRMOSIOS EILĖS DIFERENCIALINĖ LYGTIS

```
depends(y,x);
```

$$[y(x)]$$

```
eq:dx=(sin(y)+3·cos(y)+x)·dy;
```

$$dx = dy\ (\sin(y) + 3\ \cos(y) + x)$$

Ši lygtis yra tiesinė pagal x=x(y)

```
eq1:subst([dx='diff(x,y),dy=1],eq);
```

$$\frac{d}{d\ y}\ x = \sin(y) + 3\ \cos(y) + x$$

```
[x0,y0]:[%e^(%pi/2),%pi/2];
```

$$\left[\%e^{\pi/2}, \frac{\pi}{2}\right]$$

```
ats:ode2(eq1,x,y);
```

$$x = \%e^{y}\left(\frac{3\ \%e^{-y}\ (\sin(y) - \cos(y))}{2} + \frac{\%e^{-y}\ (-\sin(y) - \cos(y))}{2} + \%c\right)$$

```
expand(%);
```

$$x = \sin(y) - 2\ \cos(y) + \%c\ \%e^{y}$$

```
ic1(%, y=y0, x=x0);
```

$$x = \%e^{-\frac{\pi}{2}}\left(\%e^{\pi/2}\ \sin(y) - 2\ \%e^{\pi/2}\ \cos(y) + (\%e^{\pi/2} - 1)\ \%e^{y}\right)$$

Koši uždavinio atsakymas:

```
ats_kosi:expand(%);
```

$$x = \sin(y) - 2\ \cos(y) - \%e^{y - \frac{\pi}{2}} + \%e^{y}$$

Patikrinimas:

```
subst(ats_kosi,eq1);
```

$$\frac{d}{d\ y}\left(\sin(y) - 2\ \cos(y) - \%e^{y - \frac{\pi}{2}} + \%e^{y}\right) = 2\ \sin(y) + \cos(y) - \%e^{y - \frac{\pi}{2}} + \%e^{y}$$

```
ev(%, nouns);
```

$$2\ \sin(y) + \cos(y) - \%e^{y - \frac{\pi}{2}} + \%e^{y} = 2\ \sin(y) + \cos(y) - \%e^{y - \frac{\pi}{2}} + \%e^{y}$$

expand(%);

$$2\sin(y)+\cos(y)-\%e^{y-\frac{\pi}{2}}+\%e^{y}=2\sin(y)+\cos(y)-\%e^{y-\frac{\pi}{2}}+\%e^{y}$$

trigexpand(%);

$$2\sin(y)+\cos(y)-\%e^{y-\frac{\pi}{2}}+\%e^{y}=2\sin(y)+\cos(y)-\%e^{y-\frac{\pi}{2}}+\%e^{y}$$

trigsimp(%);

$$\%e^{-\frac{\pi}{2}}\left|2\,\%e^{\pi/2}\sin(y)+\%e^{\pi/2}\cos(y)+(\%e^{\pi/2}-1)\,\%e^{y}\right|=\%e^{-\frac{\pi}{2}}\left|2\,\%e^{\pi/2}\sin(y)+\%e^{\pi/2}\cos(y)+(\%e^{\pi/2}-1)\,\%e^{y}\right|$$

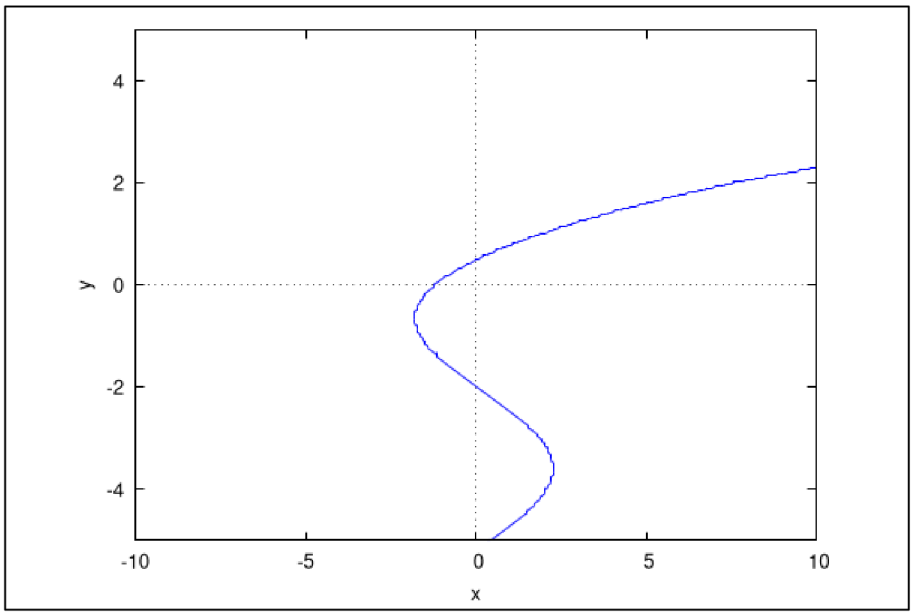
is(%);

true

Sprendinio grafikas ir krypčių laukas

load(implicit_plot)$

wximplicit_plot(ats_kosi,[x,–10,10],[y,–5,5]);



solve(eq1,'diff(x,y))[1];

$$\frac{d}{d\,y}\,x=\sin(y)+3\,\cos(y)+x$$

f:1/rhs(%);

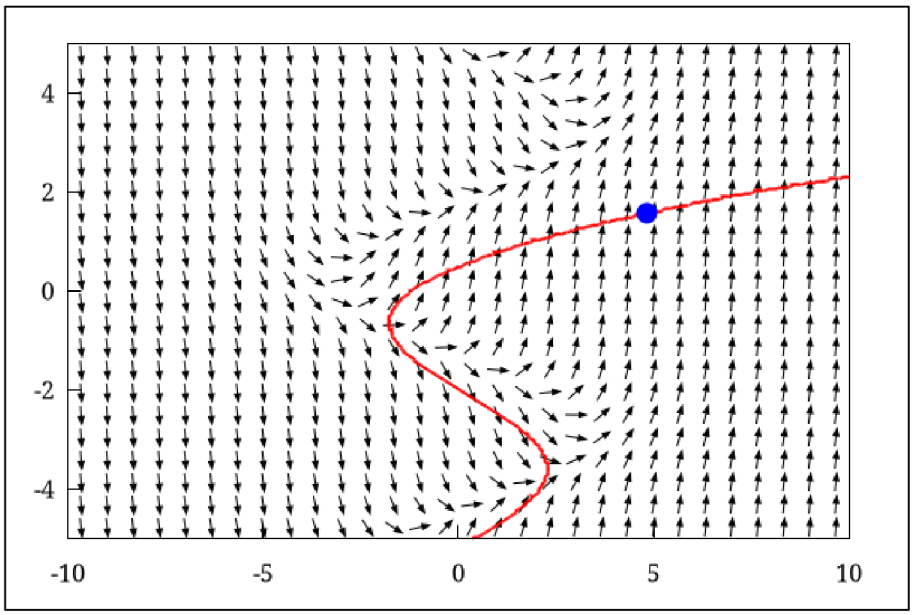
$$\frac{1}{\sin(y)+3\,\cos(y)+x}$$

```
f:subst(y(x)=y,rhs(eq1));
```

$$\sin(y)+3\cos(y)+x$$

```
load(drawdf)$


wxdrawdf(f,[x,–10,10],[y,–5,5],
line_width=2,
implicit(ats_kosi,x,–10,10,y,–5,5),
color=blue,
point_type=filled_circle,
point_size=2,
points([[x0,y0]])
);
```



0