

[4] TIESINĖ PIRMOSIOS EILĖS DIFERENCIALINĖ LYGTIS

```
reset()$ kill(all)$
```

```
eq:'diff(y(x),x)+x*y(x)=-x^3;
```

$$\frac{d}{dx} y(x) + x y(x) = -x^3$$

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

$$\frac{d}{dx} y(x) = -x y(x) - x^3$$

```
[x0,y0]:[1,1/%e];
```

$$\left[1, e^{-1} \right]$$

Naudojant ODE2 funkciją

```
ats:ode2(eq,y(x),x),expand;
```

$$y(x) = c e^{-\frac{x^2}{2}} - x^2 + 2$$

```
subst([x=x0,y(1)=y0],ats);
```

$$e^{-1} = \frac{c}{\sqrt{e}} + 1$$

```
solve(% ,c), expand;
```

$$\left[c = \frac{1}{\sqrt{e}}, -\sqrt{e} \right]$$

Atsakymas:

```
ats_kosi: subst(% ,ats),expand;
```

$$y(x) = -e^{1/2 - \frac{x^2}{2}} + e^{-\frac{x^2}{2}} - \frac{1}{2} - x^2 + 2$$

Patikrinimas:

```
subst(ats_kosi,eq);
```

$$\frac{d}{dx} \left[-e^{1/2 - \frac{x^2}{2}} + e^{-\frac{x^2}{2}} - \frac{1}{2} - x^2 + 2 \right] + x \left[-e^{1/2 - \frac{x^2}{2}} + e^{-\frac{x^2}{2}} - \frac{1}{2} - x^2 + 2 \right] = -x^3$$

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

$$x^{\frac{1}{2} - \frac{x^2}{2}} e^{-\frac{x^2}{2} - \frac{1}{2}} + x \left(-e^{-\frac{x^2}{2} - \frac{1}{2}} - \frac{x^2}{2} e^{-\frac{x^2}{2} - \frac{1}{2}} \right) - x^2 e^{-\frac{x^2}{2} - \frac{1}{2}} - 2x = -x^3$$

```
expand(%);
```

$$-x^3 = -x^3$$

```
is(%);
```

true

Sprendinio grafikas ir krypčių laukas

```
load(drawdf)$
```

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

$$-x y - x^3$$

```
wxdrawdf(f,[x,0,2],[y,0,2],
color=red,
explicit(rhs(ats_kosi),x,0,2),
color=blue,
point_type=filled_circle,
point_size=2,
points([[x0,y0]])
);
```

