

```
> dsolve( { y'(x) = x^2 - y(x), y(1) = 1/2 } );
```

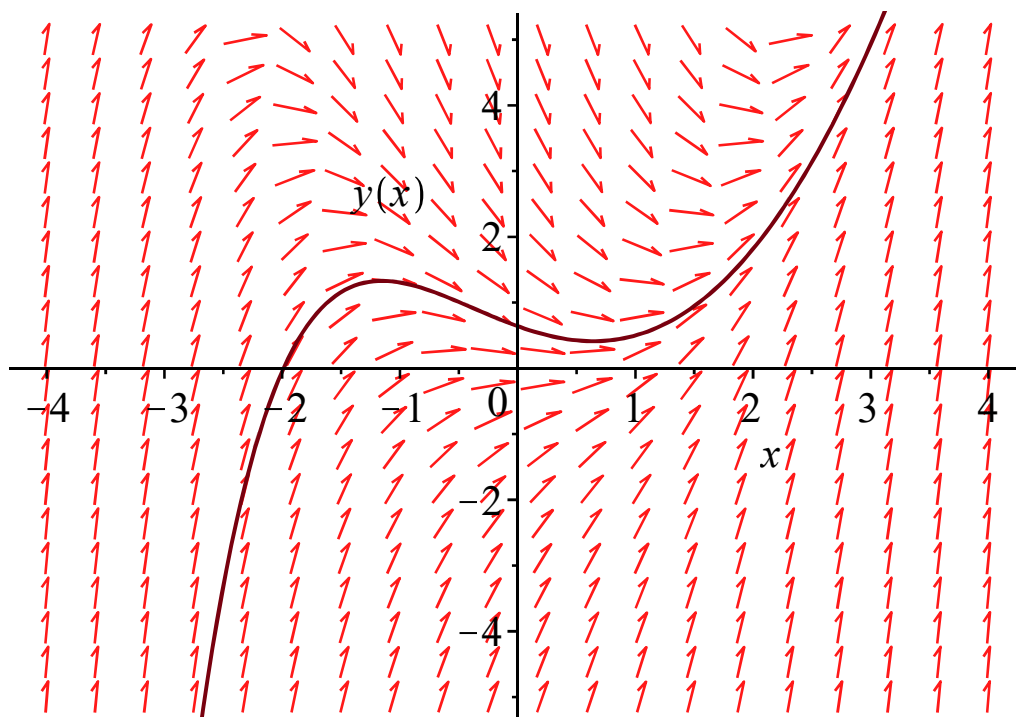
$$y(x) = x^2 - 2x + 2 - \frac{e^{-x}}{2e^{-1}}$$

(1)

```
> field := DEtools[dfieldplot](y'(x) = x^2 - y(x), y(x), x = -4 .. 4, y = -5 .. 5) :
```

```
grafic := plot( x^2 - 2x + 2 - \frac{e^{-x}}{2e^{-1}}, x = -4 .. 4, y = -5 .. 5 ) :
```

```
plots[display](field, graphic);
```



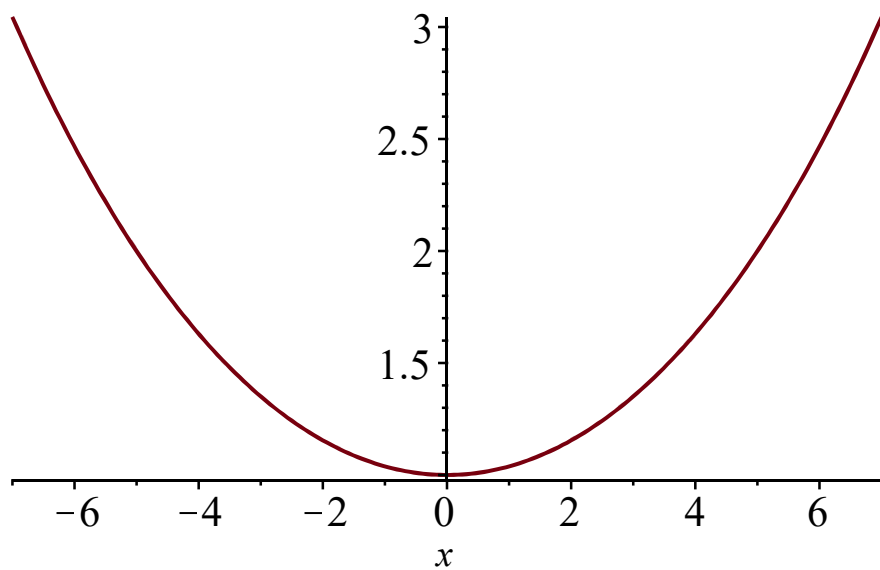
Задание2

```
> dsolve( { y'(x) = \frac{x}{\sqrt{169 - x^2}}, y(5) = 2 } );
```

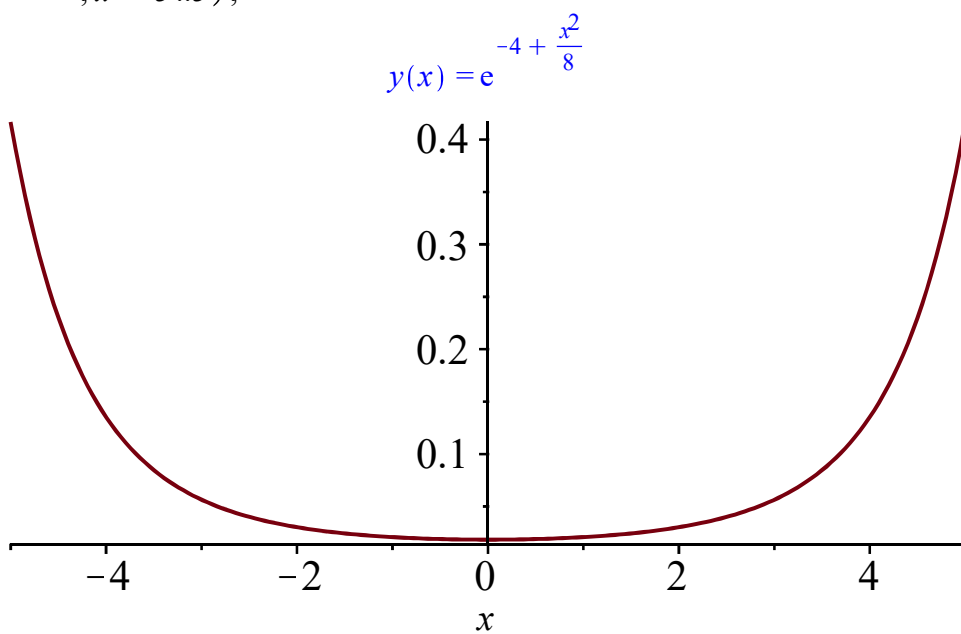
$$y(x) = \frac{(x-13)(x+13)}{\sqrt{-x^2+169}} + 14$$

(2)

```
> plot( \frac{x^2 + 14\sqrt{-x^2+169} - 169}{\sqrt{-x^2+169}}, x = -7 .. 7 );
```

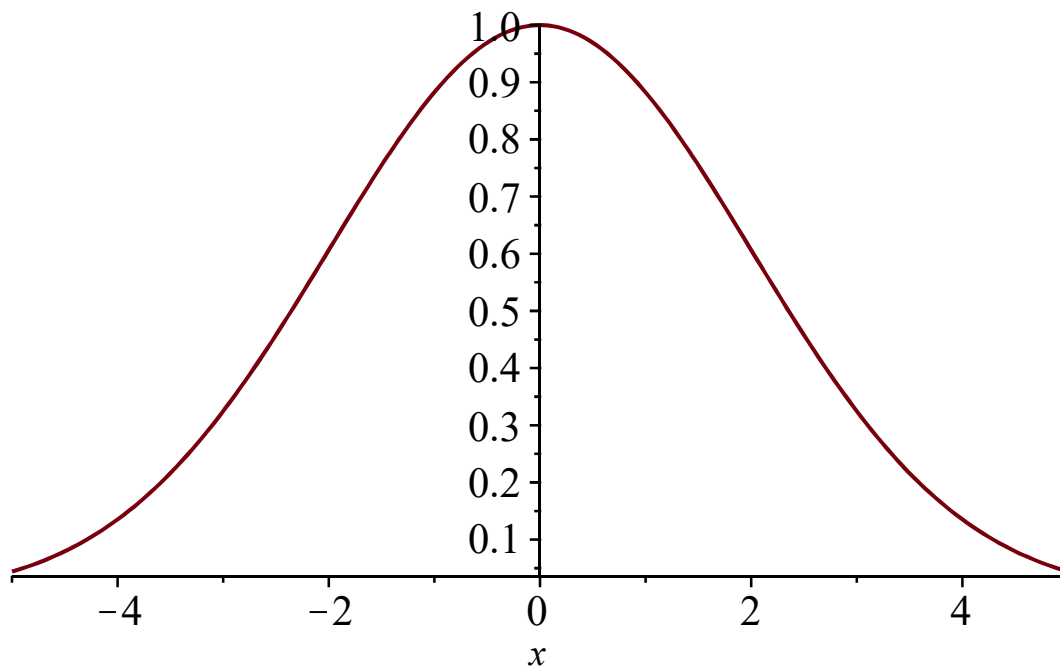


> $\text{simplify}\left(\text{dsolve}\left(\left\{y'(x) = \frac{1}{4} \cdot x \cdot y(x), y(4) = e^{-2}\right\}\right)\right);$
 $\text{plot}\left(e^{-4 + \frac{x^2}{8}}, x = -5..5\right);$



> $\text{simplify}\left(\text{dsolve}\left(\left\{y'(x) = -\frac{1}{4} \cdot x \cdot y(x), y(4) = e^{-2}\right\}\right)\right);$
 $\text{plot}\left(e^{-\frac{x^2}{8}}, x = -5..5\right);$

$$y(x) = e^{-\frac{x^2}{8}}$$

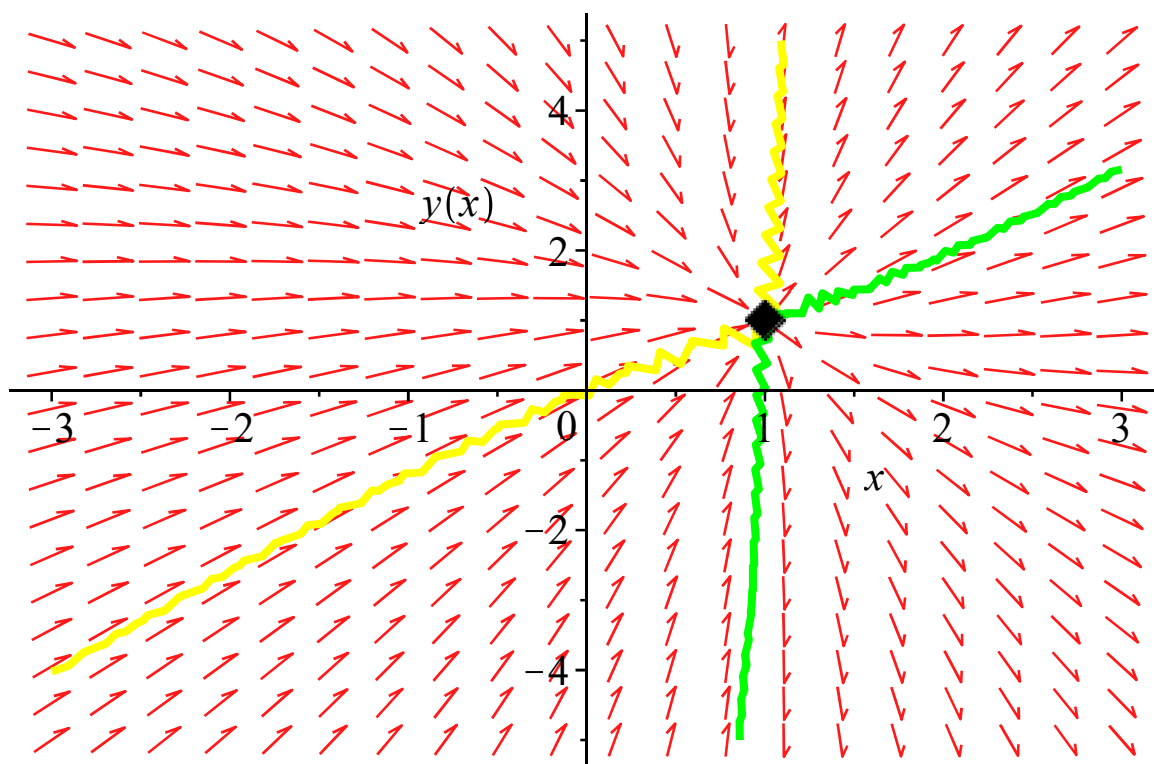


Задание 3

```
> simplify( dsolve( y'(x) = (20*x + 77*y(x) - 97) / (76*x + y(x) - 77) ) );
```

$$-9 \ln\left(\frac{-y(x) - 4 + 5x}{x - 1}\right) + 8 \ln\left(\frac{-y(x) + 5 - 4x}{x - 1}\right) - \ln(x - 1) - _C1 = 0 \quad (3)$$

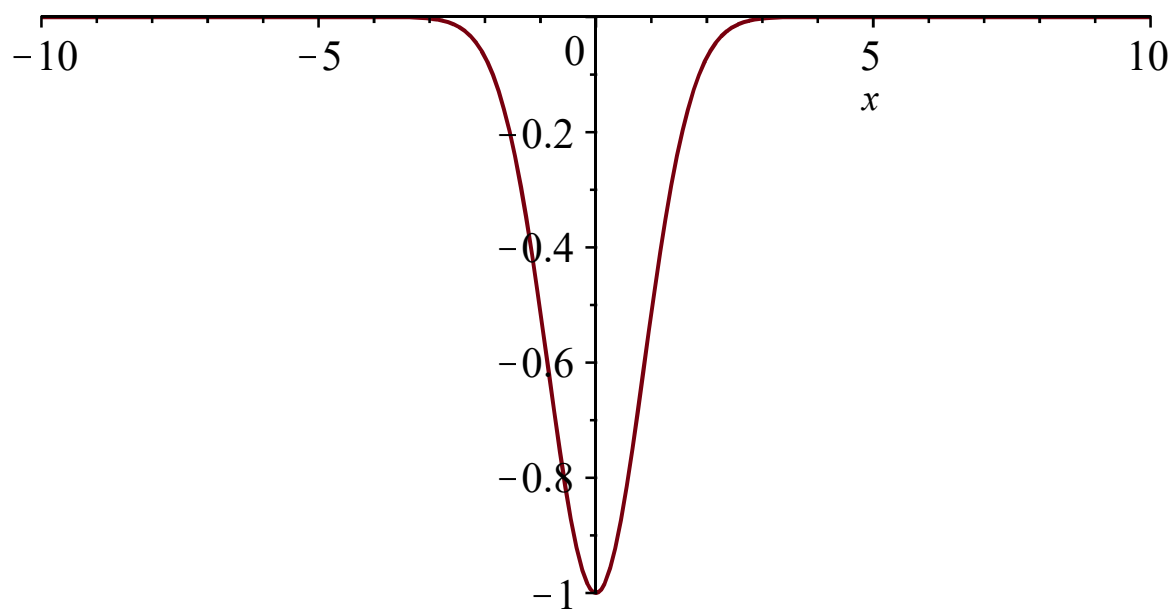
```
> field := DEtools[dfieldplot]( y'(x) = (20*x + 77*y(x) - 97) / (76*x + y(x) - 77), y(x), x=-3..3, y=-5..5 ) :
grafic1 := plots[implicitplot]( (y + 4*x - 5)^8 = (y - 5*x + 4)^9, x=-3..3, y=-5..5, thickness
= 3, color = yellow ) :
grafic2 := plots[implicitplot]( (y + 4*x - 5)^8 = -(y - 5*x + 4)^9, x=-3..3, y=-5..5, thickness
= 3, color = green ) :
p := plots[pointplot]( [[1, 1]], symbol = soliddiamond, symbolsize = 30 ) :
plots[display]( field, graphic1, graphic2, p );
```



Задание 4

> $\text{simplify}(\text{dsolve}(\{3 \cdot y'(x) + 2 \cdot x \cdot y(x) = 2 \cdot x \cdot y(x)^{-2} \cdot e^{-2 \cdot x^2}, y(0) = -1\}));$
 $\text{plot}(-(\exp(-2 \cdot x^2))^{1/3});$

$$y(x) = \frac{(-e^{x^2})^{1/3} (I\sqrt{3} - 1) e^{-x^2}}{2}$$

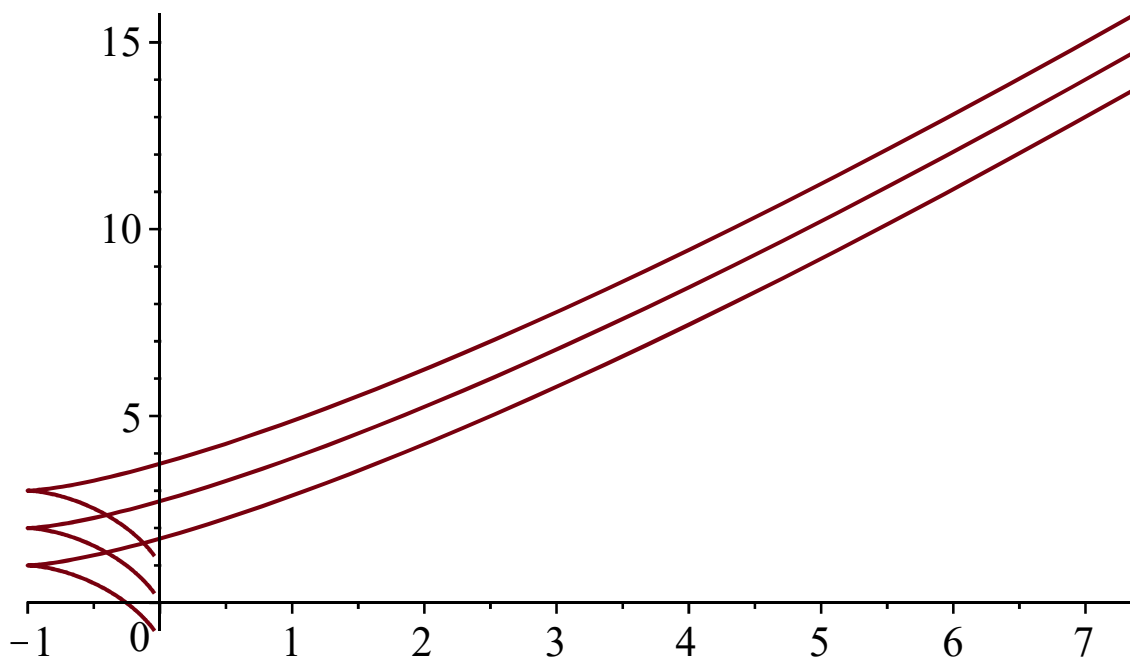


Задание 5

> $\text{dsolve}(x = (y'(x) - 1) \cdot e^{y'(x)});$

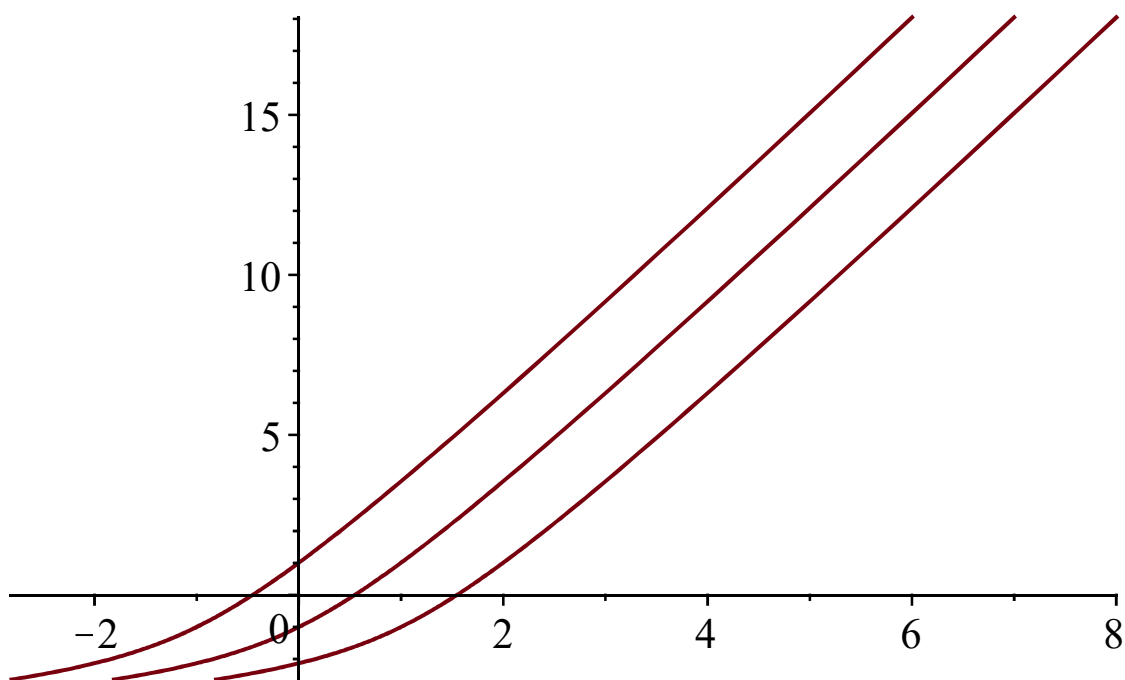
```
grafic(C) := plot([e^p·(p - 1), e^p·(p^2 - 2·p + 2) + C, p=-5..2]) :
plots[display](grafic(-1), grafic(0), grafic(1));
```

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



```
> dsolve(y(x) = (ln(|sin(y'(x))|) - y'(x)·cot(y'(x)) - 1));
grafic(C) := plot([-cot(p) + C, ln(|sin(p)|) - p·cot(p) - 1, p=0.5..3]) :
plots[display](grafic(-1), grafic(0), grafic(1));
```

$$x - \left(\int^{y(x)} \frac{1}{\text{RootOf}(_a - \ln(|\sin(_Z)|) + _Z \cot(_Z) + 1)} d_a \right) - _CI = 0$$



Задание 6

> $dsolve(y(x) = x \cdot y'(x) - 3 \cdot y'(x)^2 - 1);$

$f(C) := -3 \cdot C^2 + x \cdot C - 1;$

$plot\left(\left[f(-3), f(-2), f(-1), f(0), f(1), f(2), f(3), \frac{x^2}{12} - 1\right], x = -15..15, y = -10..20\right);$

$$y(x) = \frac{x^2}{12} - 1, y(x) = -3 \cdot C^2 + Cx - 1$$

