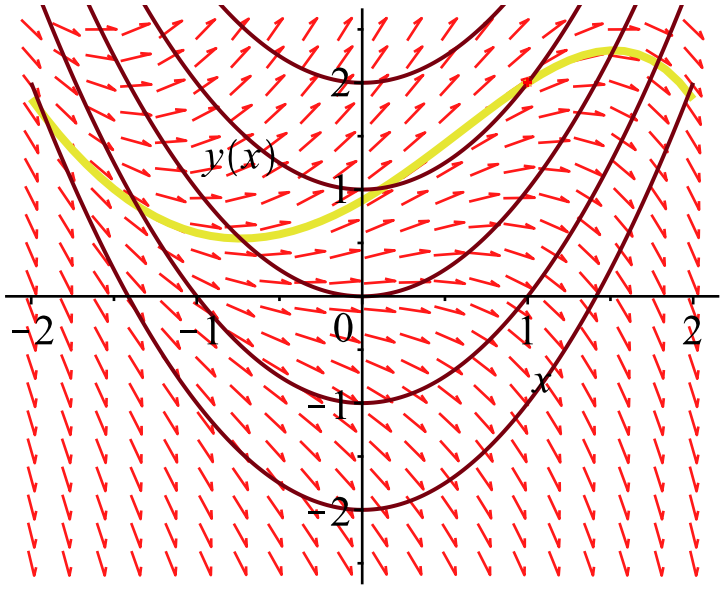
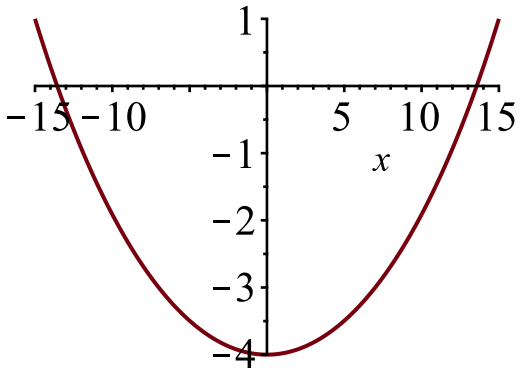
```
> #1
> with(DETools):
> plot1 := DEplot(diff(y(x),x) = y(x) - x^2, y(x), x = -2..2, y = -2.5..2.5, [y(1) = 2]):
> iso1 := plot(x^2 - 2, x = -2..2):
> iso2 := plot(x^2 - 1, x = -2..2):
> iso3 := plot(x^2, x = -2..2):
> iso4 := plot(x^2 + 1, x = -2..2):
> iso5 := plot(x^2 + 2, x = -2..2):
> plotPoint := plot([[1, 2]], style = point, color = red):
> plots[display](plot1, iso1, iso2, iso3, iso4, iso5, plotPoint)
```




```
> #2.1
> dsolve({diff(y(x),x) = x/sqrt(25^2 - x^2), y(15) = 1});
```

$$y(x) = \frac{(x-25)\,(x+25)}{\sqrt{-x^2+625}} + 21 \qquad \textbf{(1)}$$

```
> plot((x-25)·(x+25)/sqrt(-x^2+625) + 21, x = -15..15)
```

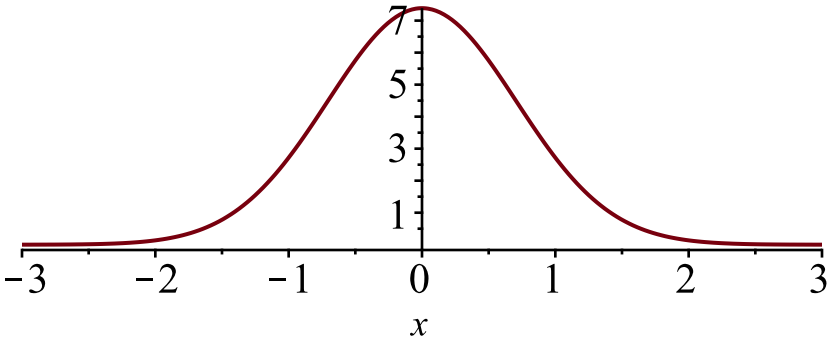


> #2.2

> $simplify\left(dsolve\left(\left\{\frac{d}{dx}y(x) = -2\cdot x\cdot y(x), y(1) = \exp(1)\right\}\right)\right)$

$$y(x) = e^{-x^2+2} \quad \textbf{(2)}$$

> $plot(\exp(-x^2+2), x=-3..3)$

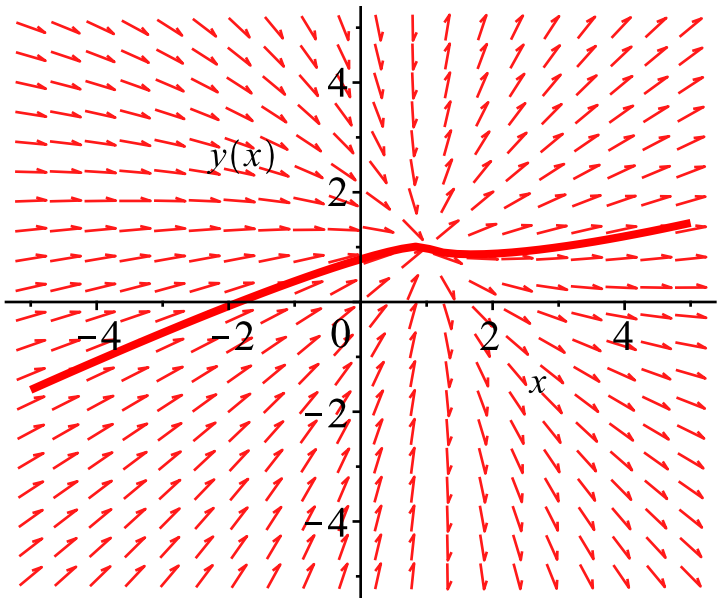



> #3

> $dsolve\left(diff(y(x),x) = \frac{4\cdot x+21\cdot y(x)-25}{24\cdot x+y(x)-25}\right)$

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

> $DEplot\left(diff(y(x),x) = \frac{4\cdot x+21\cdot y(x)-25}{24\cdot x+y(x)-25}, y(x), x=-5..5, y=-5..5, [y(3)=1], linecolor=red\right)$



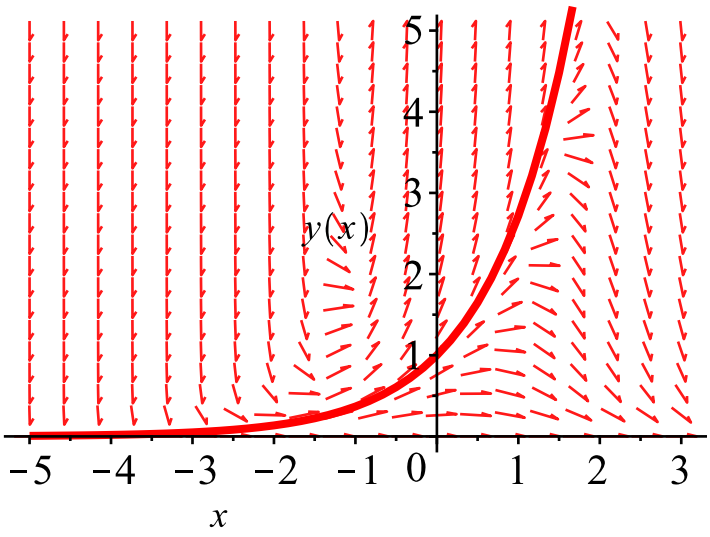

> #4

> $dsolve\left(\{diff(y(x),x) + x\cdot y(x) = (1+x)\cdot\exp(-x)\cdot(y(x))^2, y(0)=1\}\right)$

$$y(x) = \frac{1}{e^{-x}} \quad \textbf{(4)}$$

> $DEplot\left(diff(y(x),x) + x\cdot y(x) = (1+x)\cdot\exp(-x)\cdot(y(x))^2, y(x), x=-5..3, y=0..5, [y(0)\right.$

$= 1\,], linecolor = red)$



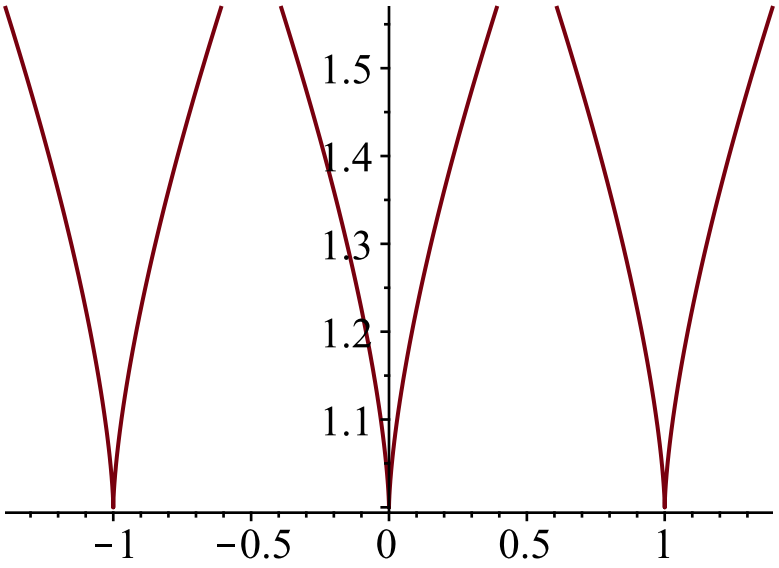

```
> #5.1
> restart
> x := p→p·arcsin(p) + sqrt(1 - p^2)
```

$$x := p \mapsto p \arcsin(p) + \sqrt{1 - p^2} \tag{5}$$

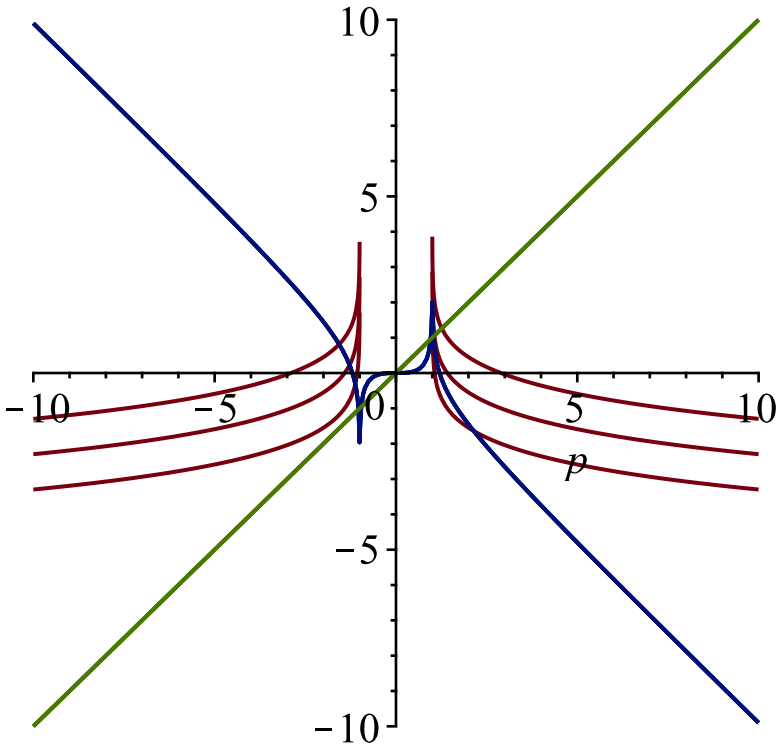
```
> y := rhs(dsolve(d/dp y(p) = p·d/dp x(p)))
```

$$y := \frac{p^2 \arcsin(p)}{2} + \frac{p\sqrt{-p^2+1}}{4} - \frac{\arcsin(p)}{4} + \_C1 \tag{6}$$

```
> plotc := c→plot([p^2·arcsin(p)/2 + p·sqrt(-p^2+1)/4 - arcsin(p)/4 + c, p·arcsin(p) + sqrt(1-p^2),
    p = -1..1]) :
> plots[display]([plotc(-1), plotc(0), plotc(1)])
```




```
> #5.2
> restart
> y := p -> 1/2 * ln(abs((1+p)/(1-p))) - p:
> x := rhs(dsolve(diff(y(p),p) = p * diff(x(p),p))):
> plotc := c -> plot([-ln((1+p)*(p-1))/2 + c, 1/2*ln(abs((1+p)/(1-p))) - p, p]):
> plots[display]([plotc(-1), plotc(0), plotc(1)])
```




```
> #6
```

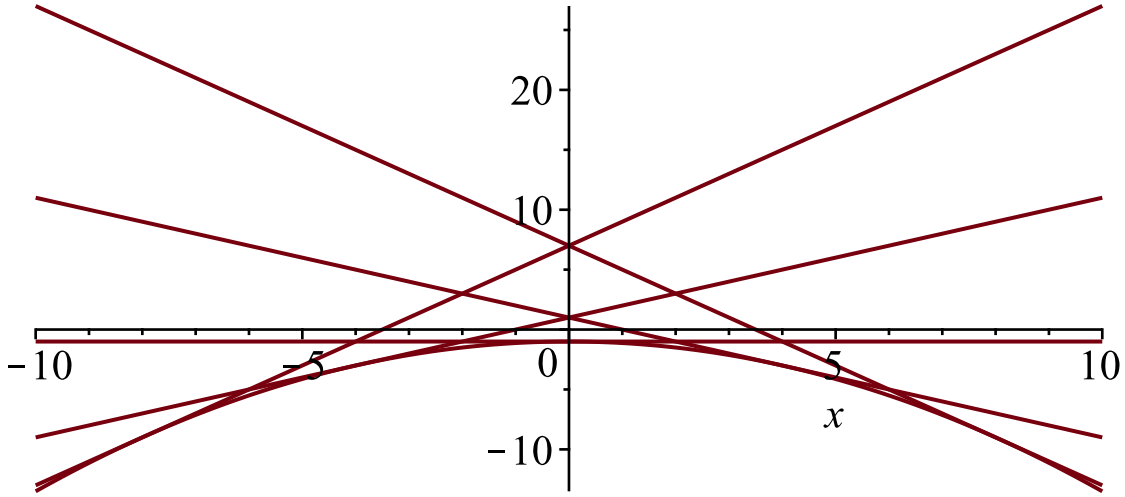
```
> restart
> y0 := rhs( dsolve( y(x) = x · (d/dx) y(x) + 2·( (d/dx) y(x) )^2 - 1, y(x) )[1] )
```

$$y0 := -\frac{x^2}{8} - 1 \tag{7}$$

```
> y := rhs( dsolve( y(x) = x · (d/dx) y(x) + 2·( (d/dx) y(x) )^2 - 1, y(x) )[2] )
```

$$y := 2\_C1^2 + x\_C1 - 1 \tag{8}$$

```
> yc := c→plot( [2· c^2 + x c - 1] ) :
> y0 := plot( -x^2/8 - 1 ) :
> plots[display]( [y0, yc(0), yc(1), yc(-1), yc(2), yc(-2)] )
```




```
>
```