

$$\begin{aligned}
& \text{restart} \\
& \text{Ecuacion} := \text{diff}(y(x), x) = \frac{2 \cdot x \cdot y(x)}{3 \cdot x \cdot 2 - y(x) \cdot 2} \\
& \quad \text{Ecuacion} := \frac{d}{dx} y(x) = \frac{2 x y(x)}{3 x^2 - y(x)^2} \tag{1} \\
& \text{with(DEtools) :} \\
& \text{odeadvisor(Ecuacion)} \\
& \quad [[_homogeneous, class A], _rational, _dAlembert] \tag{2} \\
& \text{EcuacionFormaDistinta} := -2 x y(x) + (3 x^2 - y(x)^2) \cdot \text{diff}(y(x), x) = 0 \\
& \quad \text{EcuacionFormaDistinta} := -2 x y(x) + (3 x^2 - y(x)^2) \left( \frac{d}{dx} y(x) \right) = 0 \tag{3} \\
& M(x, y) := -2 x y; \\
& \quad M(x, y) := -2 x y \tag{4} \\
& N(x, y) := 3 x^2 - y^2 \\
& \quad N(x, y) := 3 x^2 - y^2 \tag{5} \\
& MM(x, y) := \text{factor}(\text{subs}(x = \text{lambda} \cdot x, y = \text{lambda} \cdot y, M(x, y))); \\
& \quad MM(x, y) := -2 \lambda^2 x y \tag{6} \\
& NN(x, y) := \text{factor}(\text{subs}(x = \text{lambda} \cdot x, y = \text{lambda} \cdot y, N(x, y))); \\
& \quad NN(x, y) := \lambda^2 (3 x^2 - y^2) \tag{7} \\
& \text{EcuacionSeparable} := \text{simplify}(\text{isolate}(\text{eval}(\text{subs}(y(x) = u(x) \cdot x, \text{EcuacionFormaDistinta})), \\
& \quad \text{diff}(u(x), x))) \\
& \quad \text{EcuacionSeparable} := \frac{d}{dx} u(x) = - \frac{u(x) (-1 + u(x)^2)}{x (-3 + u(x)^2)} \tag{8} \\
& \text{EcuacionSeparada} := -\text{rhs}(\text{EcuacionSeparable}) + \text{lhs}(\text{EcuacionSeparable}) = 0 \\
& \quad \text{EcuacionSeparada} := \frac{u(x) (-1 + u(x)^2)}{x (-3 + u(x)^2)} + \frac{d}{dx} u(x) = 0 \tag{9} \\
& M(x, u) := \frac{u(-1 + u^2)}{x(-3 + u^2)}; N(x, u) := 1; \\
& \quad M(x, u) := \frac{u(-1 + u^2)}{x(-3 + u^2)} \\
& \quad N(x, u) := 1 \tag{10} \\
& P(x) := \frac{1}{x}; Q(u) := \frac{u(-1 + u^2)}{(-3 + u^2)}; R(x) := 1; S(u) := 1; \\
& \quad P(x) := \frac{1}{x} \\
& \quad Q(u) := \frac{u(-1 + u^2)}{-3 + u^2} \\
& \quad R(x) := 1 \\
& \quad S(u) := 1 \tag{11}
\end{aligned}$$

$$\begin{aligned} &> \text{SolucionGeneral} := \int \left( \frac{P(x)}{R(x)}, x \right) + \int \left( \frac{S(u)}{Q(u)}, u \right) = C1 \\ &\quad \text{SolucionGeneral} := \ln(x) - \ln(u + 1) + 3 \ln(u) - \ln(u - 1) = C1 \end{aligned} \quad (12)$$

$$\begin{aligned} &> \text{SolucionFinal} := \text{subs} \left( u = \frac{y}{x}, \text{SolucionGeneral} \right) \\ &\quad \text{SolucionFinal} := \ln(x) - \ln \left( \frac{y}{x} + 1 \right) + 3 \ln \left( \frac{y}{x} \right) - \ln \left( \frac{y}{x} - 1 \right) = C1 \end{aligned} \quad (13)$$

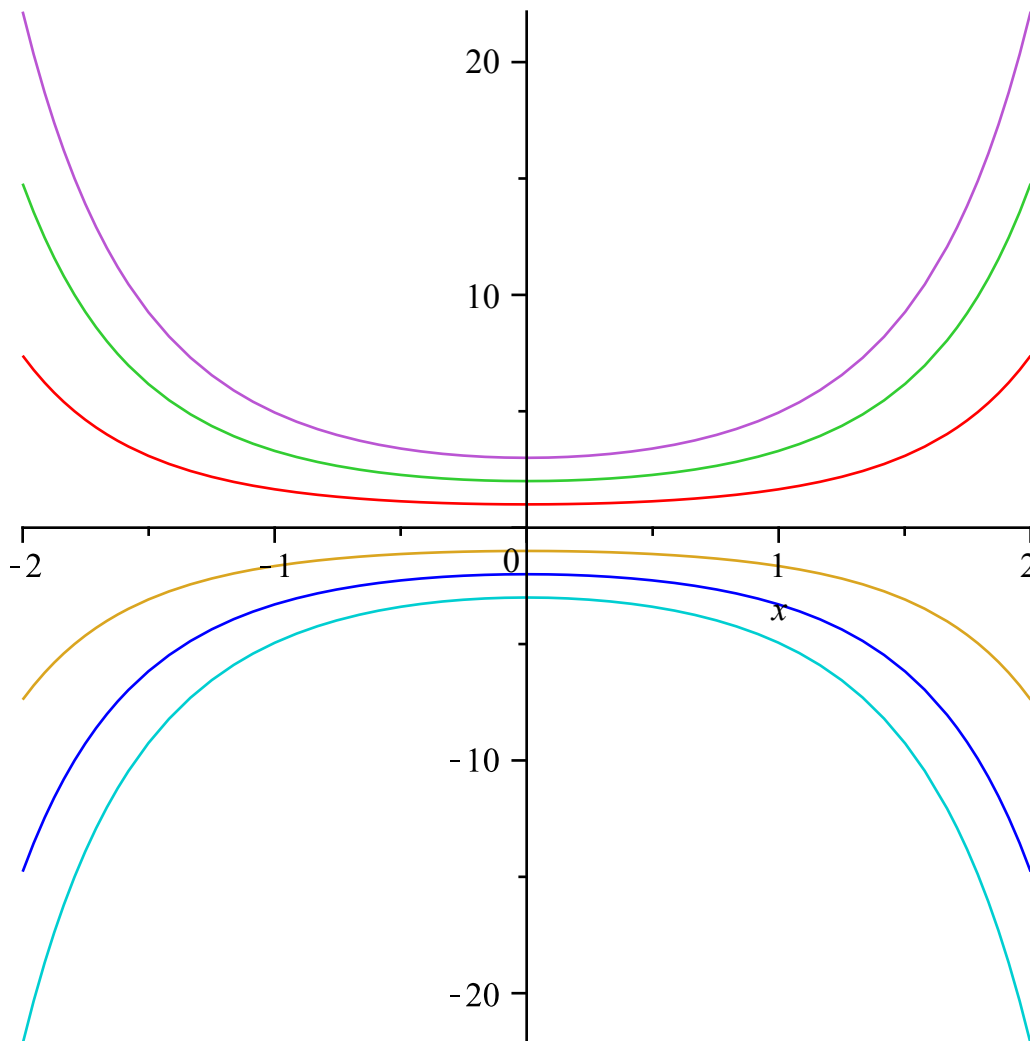
$\text{restart}$

$\text{C}$

$$\begin{aligned} &> \text{Ecuacion} := \text{diff}(y(x), x) = x \cdot y(x) \\ &\quad \text{Ecuacion} := \frac{d}{dx} y(x) = x y(x) \end{aligned} \quad (14)$$

$$\begin{aligned} &> \text{Solucion} := \text{dsolve}(\text{Ecuacion}) \\ &\quad \text{Solucion} := y(x) = \_C1 e^{\frac{1}{2} x^2} \end{aligned} \quad (15)$$

$\text{plot}([ \text{rhs}(\text{subs}(\_C1 = 1, \text{Solucion})), \text{rhs}(\text{subs}(\_C1 = 2, \text{Solucion})), \text{rhs}(\text{subs}(\_C1 = -1, \text{Solucion})), \text{rhs}(\text{subs}(\_C1 = -2, \text{Solucion})), \text{rhs}(\text{subs}(\_C1 = 3, \text{Solucion})), \text{rhs}(\text{subs}(\_C1 = -3, \text{Solucion})) ], x = -2..2)$



```
> restart
```

```
> Ecuacion := diff(y(x), x) =  $\frac{y(x)}{x}$ ;
```

$$Ecuacion := \frac{d}{dx} y(x) = \frac{y(x)}{x}$$

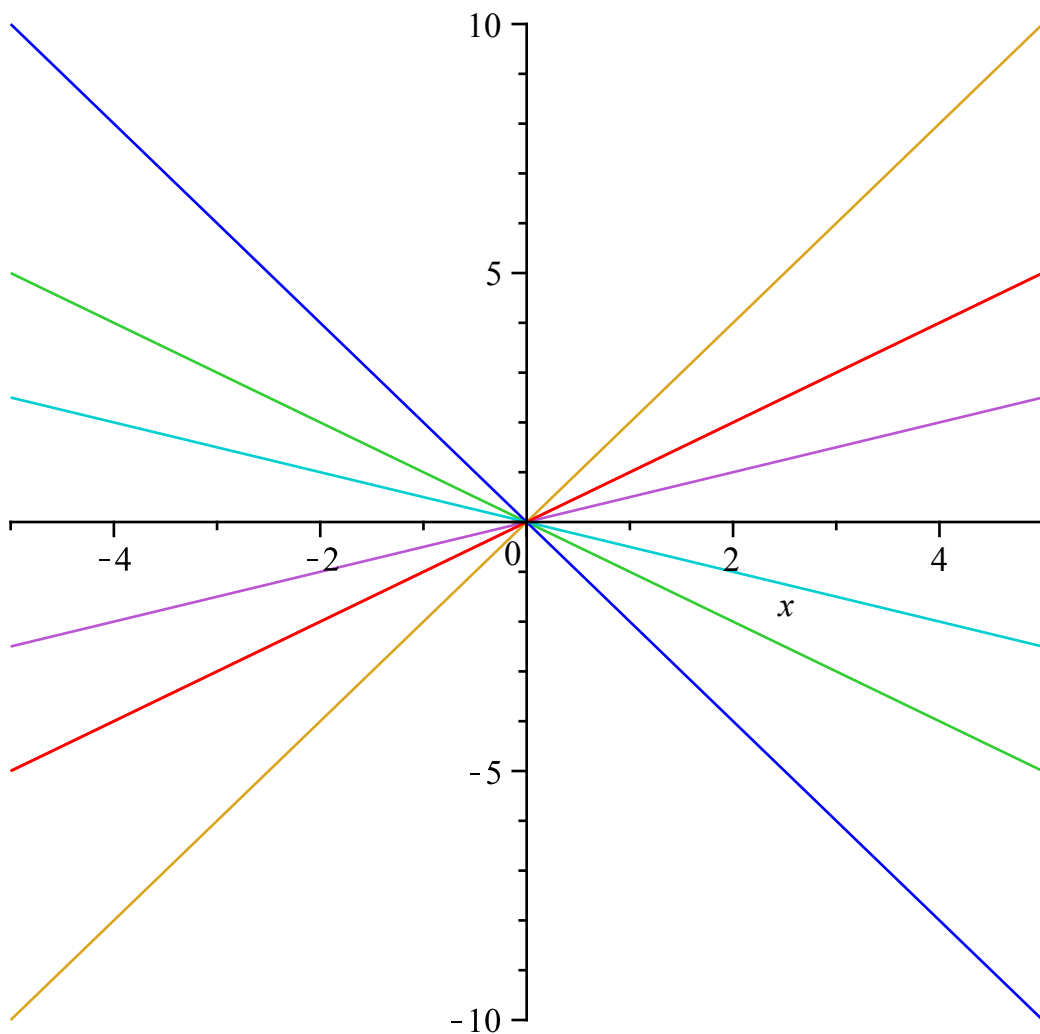
(16)

```
> Solucion := dsolve(Ecuacion)
```

$$Solucion := y(x) = \_C1 x$$

(17)

```
> plot([rhs(subs(_C1 = 1, Solucion)), rhs(subs(_C1 = -1, Solucion)), rhs(subs(_C1 = 2, Solucion)), rhs(subs(_C1 = -2, Solucion)), rhs(subs(_C1 =  $\frac{1}{2}$ , Solucion)), rhs(subs(_C1 =  $-\frac{1}{2}$ , Solucion)), rhs(subs(_C1 = 1, Solucion))], x = -5..5)
```



```
> restart
```

```
> Ecuacion := diff(y(x), x) =  $\frac{x}{y(x)}$ ;
```

$$Ecuacion := \frac{d}{dx} y(x) = \frac{x}{y(x)}$$

(18)

$$> M(x, y) := -\frac{x}{y};$$

$$M(x, y) := -\frac{x}{y} \quad (19)$$

$$> \text{diff}(M(x, y), y)$$

$$\frac{x}{y^2} \quad (20)$$

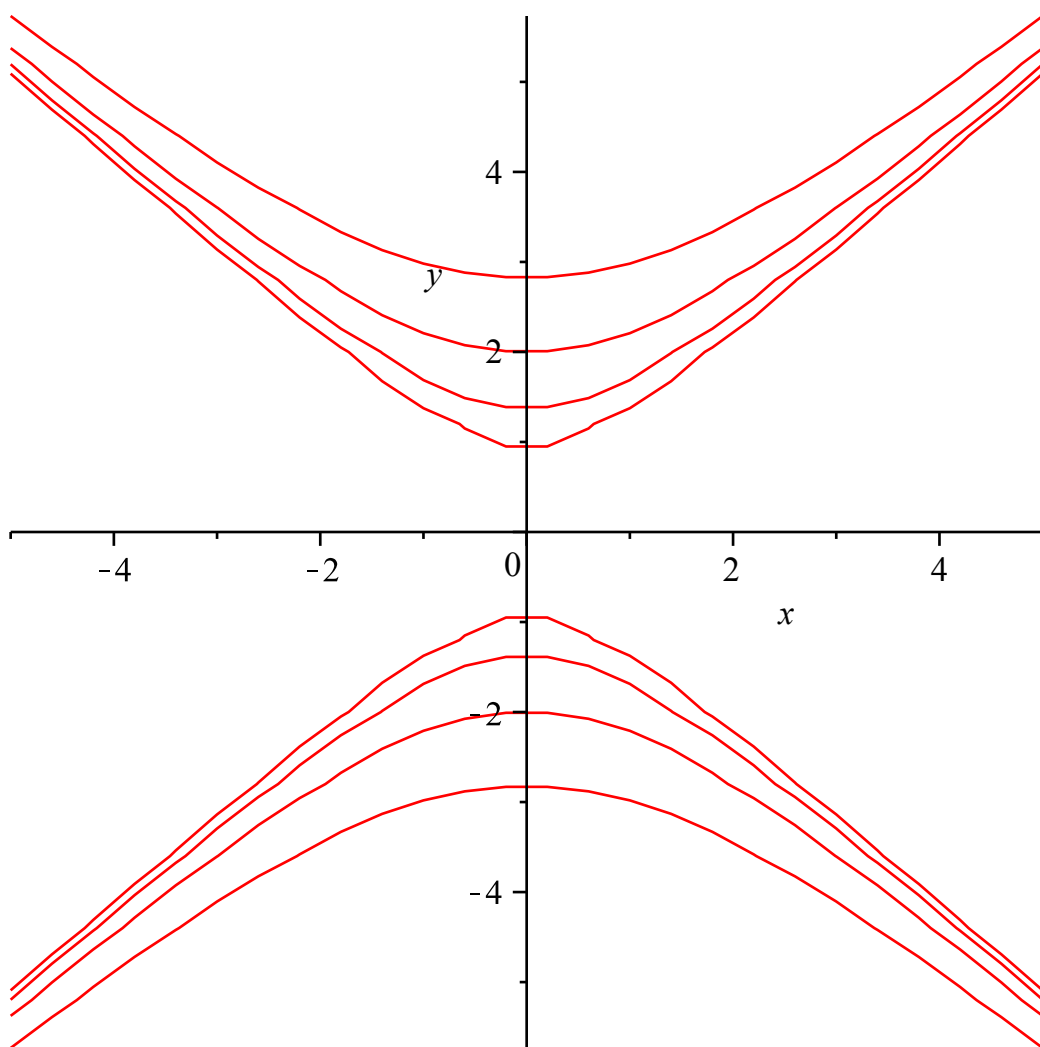
$$> \text{Solucion} := \text{int}(-x, x) + \text{int}(y, y) = C1$$

$$\text{Solucion} := -\frac{1}{2} x^2 + \frac{1}{2} y^2 = C1 \quad (21)$$

$$> \text{with}(plots);$$

$$[\text{animate}, \text{animate3d}, \text{animatecurve}, \text{arrow}, \text{changecoords}, \text{complexplot}, \text{complexplot3d}, \text{conformal}, \text{conformal3d}, \text{contourplot}, \text{contourplot3d}, \text{coordplot}, \text{coordplot3d}, \text{densityplot}, \text{display}, \text{dualaxisplot}, \text{fieldplot}, \text{fieldplot3d}, \text{gradplot}, \text{gradplot3d}, \text{graphplot3d}, \text{implicitplot}, \text{implicitplot3d}, \text{inequal}, \text{interactive}, \text{interactiveparams}, \text{intersectplot}, \text{listcontplot}, \text{listcontplot3d}, \text{listdensityplot}, \text{listplot}, \text{listplot3d}, \text{loglogplot}, \text{logplot}, \text{matrixplot}, \text{multiple}, \text{odeplot}, \text{pareto}, \text{plotcompare}, \text{pointplot}, \text{pointplot3d}, \text{polarplot}, \text{polygonplot}, \text{polygonplot3d}, \text{polyhedra\_supported}, \text{polyhedraplot}, \text{rootlocus}, \text{semilogplot}, \text{setcolors}, \text{setoptions}, \text{setoptions3d}, \text{spacecurve}, \text{sparsematrixplot}, \text{surfdata}, \text{textplot}, \text{textplot3d}, \text{tubeplot}] \quad (22)$$

$$> \text{implicitplot}\left(\left[\text{subs}(C1 = 1, \text{Solucion}), \text{subs}(C1 = 2, \text{Solucion}), \text{subs}\left(C1 = \frac{1}{2}, \text{Solucion}\right), \text{subs}(C1 = 4, \text{Solucion})\right], x = -5 .. 5, y = -10 .. 10\right)$$



```
> restart
```

```
> Ecuacion := x·4·log(x) - 2·x·y(x)·3 + 3·x·2·y(x)·2·diff(y(x), x) = 0
```

$$Ecuacion := x^4 \ln(x) - 2 x y(x)^3 + 3 x^2 y(x)^2 \left( \frac{d}{dx} y(x) \right) = 0 \quad (23)$$

```
> with(DEtools) :
```

```
> odeadvisor(Ecuacion)
```

[\_Bernoulli] (24)

```
> FacInt := intfactor(Ecuacion)
```

$$FacInt := \frac{1}{x^4} \quad (25)$$

```
> M(x, y) := x^4 ln(x) - 2 x y^3
```

$$M(x, y) := x^4 \ln(x) - 2 x y^3 \quad (26)$$

```
> N(x, y) := 3 x^2 y^2
```

$$N(x, y) := 3 y^2 x^2 \quad (27)$$

```
> comp1 := simplify(diff(M(x, y), y) - diff(N(x, y), x)) = 0
```

$$comp1 := -12 y^2 x = 0 \quad (28)$$

>  $MM(x, y) := \text{expand}(\text{FacInt} \cdot M(x, y)); NN(x, y) := \text{simplify}(\text{FacInt} \cdot N(x, y))$

$$MM(x, y) := \ln(x) - \frac{2y^3}{x^3}$$

$$NN(x, y) := \frac{3y^2}{x^2} \quad (29)$$

>  $\text{comp}_1 := \text{simplify}(\text{diff}(MM(x, y), y) - \text{diff}(NN(x, y), x)) = 0$

$$\text{comp}_1 := 0 = 0 \quad (30)$$

>  $\text{IntMMx} := \text{int}(MM(x, y), x);$

$$\text{IntMMx} := x \ln(x) - x + \frac{y^3}{x^2} \quad (31)$$

>  $\text{Solucion} := \text{IntMMx} + \text{int}((NN(x, y) - \text{diff}(\text{IntMMx}, y)), y) = C1$

$$\text{Solucion} := x \ln(x) - x + \frac{y^3}{x^2} = C1 \quad (32)$$

>

>

>

>

>

>

>