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> restart
> Ecua := y'' - 2·y' + 2·y = 0
      Ecua :=  $\frac{d^2}{dx^2} y(x) - 2 \frac{d}{dx} y(x) + 2 y(x) = 0$  (1)
=
> EcuaCarac := m2 - 2·m + 2 = 0
      EcuaCarac :=  $m^2 - 2 m + 2 = 0$  (2)
=
> Raiz := solve(EcuaCarac)
      Raiz := 1 + I, 1 - I (3)
=
> yy[1] := exp(Re(Raiz[1])·x)·cos(Im(Raiz[1])·x)
      yy1 := ex cos(x) (4)
=
> yy[2] := exp(Re(Raiz[1])·x)·sin(Im(Raiz[1])·x)
      yy2 := ex sin(x) (5)
=
> SolGral := y(x) = _C1·yy[1] + _C2·yy[2]
      SolGral :=  $y(x) = _C1 e^x \cos(x) + _C2 e^x \sin(x)$  (6)
=
> Ecua
       $\frac{d^2}{dx^2} y(x) - 2 \frac{d}{dx} y(x) + 2 y(x) = 0$  (7)
=
> Comprobar := eval(subs(y(x) = rhs(SolGral), Ecua))
      Comprobar := 0 = 0 (8)
=
> restart
> Ecua := y'' + 9·y = 0
      Ecua :=  $\frac{d^2}{dx^2} y(x) + 9 y(x) = 0$  (9)
=
> EcuaCarac := m2 + 9 = 0
      EcuaCarac :=  $m^2 + 9 = 0$  (10)
=
> Raiz := solve(EcuaCarac)
      Raiz := 3 I, -3 I (11)
=
> yy[1] := cos(Im(Raiz[1])·x)
      yy1 := cos(3 x) (12)
=
> yy[2] := sin(Im(Raiz[1])·x)
      yy2 := sin(3 x) (13)
=
> SolGral := y(x) = _C1·yy[1] + _C2·yy[2]
      SolGral :=  $y(x) = _C1 \cos(3 x) + _C2 \sin(3 x)$  (14)
=
> Comprobar := eval(subs(y(x) = rhs(SolGral), Ecua))
      Comprobar := 0 = 0 (15)
=
> restart
> Ecua := y'' - 4·y' + 4·y = 0

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(16)

$$Ecua := \frac{d^2}{dx^2} y(x) - 4 \frac{d}{dx} y(x) + 4 y(x) = 0 \quad (16)$$

$$> EcuaCarac := m^2 - 4 \cdot m + 4 = 0$$

$$EcuaCarac := m^2 - 4 m + 4 = 0 \quad (17)$$

$$> Raiz := solve(EcuaCarac)$$

$$Raiz := 2, 2 \quad (18)$$

$$> yy[1] := \exp(Raiz[1] \cdot x)$$

$$yy_1 := e^{2x} \quad (19)$$

$$> yy[2] := x \cdot \exp(Raiz[1] \cdot x)$$

$$yy_2 := x e^{2x} \quad (20)$$

$$> SolGral := y(x) = \_C1 \cdot yy[1] + \_C2 \cdot yy[2]$$

$$SolGral := y(x) = \_C1 e^{2x} + \_C2 x e^{2x} \quad (21)$$

$$> Ecua$$

$$\frac{d^2}{dx^2} y(x) - 4 \frac{d}{dx} y(x) + 4 y(x) = 0 \quad (22)$$

$$> Comprobar := eval(subs(y(x) = rhs(SolGral), Ecua))$$

$$Comprobar := 0 = 0 \quad (23)$$

$$> restart$$

$$> Ecua := y' = \frac{\sin(y)}{(x \cdot \cos(y) - \sin(y)^2)}$$

$$Ecua := \frac{d}{dx} y(x) = \frac{\sin(y(x))}{x \cos(y(x)) - \sin(y(x))^2} \quad (24)$$

$$> with(DEtools):$$

$$> odeadvisor(Ecua)$$

$$[[\_1st\_order, \_with\_symmetry \_ [F(x) * G(y), 0]]] \quad (25)$$

$$> intfactor(Ecua)$$

$$\frac{\sin(y(x))^2 - x \cos(y(x))}{-1 + \cos(2 y(x))}, \frac{-\sin(y(x)) + x \cot(y(x))}{\sin(y(x)) y(x) + x}, \frac{\sin(y(x))^2 - x \cos(y(x))}{(\sin(y(x)) y(x) + x)^2} \quad (26)$$

$$> EcuaDos := -\sin(y(x)) + (x \cos(y(x)) - \sin(y(x))^2) \cdot diff(y(x), x) = 0$$

$$EcuaDos := -\sin(y(x)) + (x \cos(y(x)) - \sin(y(x))^2) \left( \frac{d}{dx} y(x) \right) = 0 \quad (27)$$

$$> intfactor(EcuaDos)$$

$$\frac{1}{\sin(y(x))^2} \quad (28)$$

$$> IntFac := \frac{1}{\sin(y)^2}$$

$$IntFac := \frac{1}{\sin(y)^2} \quad (29)$$

$$\begin{aligned} &> M := -\sin(y) \\ &M := -\sin(y) \end{aligned} \quad (30)$$

$$\begin{aligned} &> N := x \cos(y) - \sin(y)^2 \\ &N := x \cos(y) - \sin(y)^2 \end{aligned} \quad (31)$$

$$\begin{aligned} &> MM := \text{IntFac} \cdot M \\ &MM := -\frac{1}{\sin(y)} \end{aligned} \quad (32)$$

$$\begin{aligned} &> NN := \text{simplify}(\text{IntFac} \cdot N) \\ &NN := x \cot(y) \csc(y) - 1 \end{aligned} \quad (33)$$

$$\begin{aligned} &> \text{simplify}(\text{diff}(MM, y) - \text{diff}(NN, x)) = 0 \\ &0 = 0 \end{aligned} \quad (34)$$

> restart

$$\begin{aligned} &> Ecua := \exp(x) \cdot (y - 1) + 2 \cdot (\exp(x) + 4) \cdot y' = 0 \\ &Ecua := e^x (y(x) - 1) + 2 (e^x + 4) \left( \frac{d}{dx} y(x) \right) = 0 \end{aligned} \quad (35)$$

> with(DEtools) :

$$\begin{aligned} &> \text{odeadvisor}(Ecua) \\ &[_{\text{separable}}] \end{aligned} \quad (36)$$

$$\begin{aligned} &> P := \exp(x); Q := (y - 1); R := \exp(x) + 4; S := 2 \\ &P := e^x \\ &Q := y - 1 \\ &R := e^x + 4 \\ &S := 2 \end{aligned} \quad (37)$$

$$\begin{aligned} &> \text{SolGral} := \int \left( \frac{P}{R}, x \right) + \int \left( \frac{S}{Q}, y \right) = \_CI \\ &\text{SolGral} := \ln(e^x + 4) + 2 \ln(y - 1) = \_CI \end{aligned} \quad (38)$$

$$\begin{aligned} &> \text{SolGralDos} := \text{simplify}(\exp(\text{lhs}(\text{SolGral}))) = \_CI \\ &\text{SolGralDos} := (e^x + 4) (y - 1)^2 = \_CI \end{aligned} \quad (39)$$

> restart

$$\begin{aligned} &> Ecua := y' = (x - 4 \cdot y - 1)^2 \\ &Ecua := \frac{d}{dx} y(x) = (x - 4 y(x) - 1)^2 \end{aligned} \quad (40)$$

$$\begin{aligned} &> \text{Func} := \text{isolate}(z(x) = x - 4 \cdot y(x) - 1, y(x)) \\ &\text{Func} := y(x) = -\frac{z(x)}{4} + \frac{x}{4} - \frac{1}{4} \end{aligned} \quad (41)$$

$$\begin{aligned} &> \text{EcuaDos} := \text{isolate}(\text{eval}(\text{subs}(y(x) = \text{rhs}(\text{Func}), \text{Ecua})), \text{diff}(z(x), x)) \\ &\text{EcuaDos} := \frac{d}{dx} z(x) = -4 z(x)^2 + 1 \end{aligned} \quad (42)$$

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$$\begin{aligned} & \textcolor{red}{>} \quad EcuaTres := 4 \cdot z(x)^2 - 1 + diff(z(x), x) = 0 \\ & \quad \quad \quad EcuaTres := 4 z(x)^2 - 1 + \frac{d}{dx} z(x) = 0 \end{aligned} \quad \textcolor{black}{(43)}$$

$$\begin{aligned} & \textcolor{red}{>} M := 4z^2 - 1 \\ & \quad\quad\quad M := 4z^2 - 1 \end{aligned} \tag{44}$$

$$\stackrel{=}{>} N := 1 \qquad \qquad \qquad N := 1 \tag{45}$$

$$\begin{aligned} & \color{red}{>} \quad P := 4; Q := z^2 - \frac{1}{4}; R := 1; S := 1 \\ & \qquad \qquad \qquad \color{blue}{P := 4} \\ & \qquad \qquad \qquad \color{blue}{Q := z^2 - \frac{1}{4}} \\ & \qquad \qquad \qquad \color{blue}{R := 1} \\ & \qquad \qquad \qquad \color{blue}{S := 1} \end{aligned} \tag{46}$$

$$\begin{aligned} &> \text{SolGral} := \text{int}\left(\frac{P}{R}, x\right) + \text{int}\left(\frac{S}{Q}, z\right) = \_CI \\ &\text{SolGral} := 4x - \ln(2z + 1) + \ln(2z - 1) = \_CI \end{aligned} \quad (47)$$

$$\begin{array}{c} \text{---} \\ \text{---} \\ \text{---} \end{array} \begin{array}{c} > \\ > \end{array}$$