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> restart
> EcuaCero := (1 + y(x)^2) - x·diff(y(x), x) = 0
      EcuaCero := 1 + y(x)^2 - x ⎛ d
      dx y(x) ⎞ = 0 (1)
=
> Ecua := (1 + y^2) - x·y' = 0
      Ecua := 1 + y(x)^2 - x ⎛ d
      dx y(x) ⎞ = 0 (2)
=
> P := 1; Q := 1 + y^2
      P := 1
      Q := y^2 + 1 (3)
=
> R := -x; S := 1
      R := -x
      S := 1 (4)
=
> SolGral := int(P/R, x) + int(S/Q, y) = _CI
      SolGral := -ln(x) + arctan(y) = _CI (5)
=
Comprobacion
> SolGralCompleta := -ln(x) + arctan(y(x)) = _CI
      SolGralCompleta := -ln(x) + arctan(y(x)) = _CI (6)
=
> SG := dsolve(Ecua)
      SG := y(x) = tan(ln(x) + c1) (7)
=
> CompruebaUno := eval(subs(y(x) = rhs(SG), Ecua))
      CompruebaUno := 0 = 0 (8)
=
> DerSolGral := isolate(diff(SolGralCompleta, x), diff(y(x), x))
      DerSolGral := d
      dx y(x) = y(x)^2 + 1
      x (9)
=
> DerEcua := isolate(Ecua, diff(y(x), x))
      DerEcua := d
      dx y(x) = -1 - y(x)^2
      x (10)
=
> ComprueboDos := simplify(rhs(DerSolGral) - rhs(DerEcua)) = 0
      ComprueboDos := 0 = 0 (11)
=
> restart
> Ecua := (x·y^2 - y^2 + x - 1) + (x^2·y - 2·x·y + x^2 + 2·y - 2·x + 2)·y' = 0
      Ecua := x y(x)^2 - y(x)^2 + x - 1 + (x^2 y(x) - 2 x y(x) + x^2 + 2 y(x) - 2 x + 2) ⎛ d
      dx y(x) ⎞ = 0 (12)
=
> with(DEtools):
> odeadvisor(Ecua)
      [_separable] (13)

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$$\begin{aligned} > M := x y^2 - y^2 + x - 1 \\ & M := x y^2 - y^2 + x - 1 \end{aligned} \quad (14)$$

$$\begin{aligned} > N := x^2 y - 2 x y + x^2 + 2 y - 2 x + 2 \\ & N := x^2 y + x^2 - 2 x y - 2 x + 2 y + 2 \end{aligned} \quad (15)$$

$$\begin{aligned} > MM := factor(M) \\ & MM := (y^2 + 1) (-1 + x) \end{aligned} \quad (16)$$

$$\begin{aligned} > NN := factor(N) \\ & NN := (x^2 - 2 x + 2) (y + 1) \end{aligned} \quad (17)$$

$$\begin{aligned} > P := (x - 1); Q := (y^2 + 1) \\ & P := -1 + x \\ & Q := y^2 + 1 \end{aligned} \quad (18)$$

$$\begin{aligned} > R := (x^2 - 2 x + 2); S := (y + 1) \\ & R := x^2 - 2 x + 2 \\ & S := y + 1 \end{aligned} \quad (19)$$

$$\begin{aligned} > SolGral := simplify\left(int\left(\frac{P}{R}, x\right) + int\left(\frac{S}{Q}, y\right)\right) = _CI \\ & SolGral := \frac{\ln(x^2 - 2 x + 2)}{2} + \frac{\ln(y^2 + 1)}{2} + \arctan(y) = _CI \end{aligned} \quad (20)$$

$$\begin{aligned} > SolGralCompleta := \frac{\ln(x^2 - 2 x + 2)}{2} + \frac{\ln(y(x)^2 + 1)}{2} + \arctan(y(x)) = _CI \\ & SolGralCompleta := \frac{\ln(x^2 - 2 x + 2)}{2} + \frac{\ln(y(x)^2 + 1)}{2} + \arctan(y(x)) = _CI \end{aligned} \quad (21)$$

> restart

$$\begin{aligned} > Ecua := -2 \cdot x \cdot y(x) + (3 \cdot x^2 - y(x)^2) \cdot diff(y(x), x) = 0 \\ & Ecua := -2 x y(x) + (3 x^2 - y(x)^2) \left(\frac{d}{dx} y(x) \right) = 0 \end{aligned} \quad (22)$$

> with(DEtools):

$$\begin{aligned} > odeadvisor(Ecua) \\ & [[_homogeneous, class A], _rational, _dAlembert] \end{aligned} \quad (23)$$

$$\begin{aligned} > EcuaDos := simplify(isolate(eval(subs(y(x) = u(x) \cdot x, Ecua)), diff(u(x), x))) \\ & EcuaDos := \frac{d}{dx} u(x) = \frac{u(x) \left(-1 + \frac{2}{3 - u(x)^2} \right)}{x} \end{aligned} \quad (24)$$

$$\begin{aligned} > odeadvisor(EcuaDos) \\ & [_separable] \end{aligned} \quad (25)$$

$$\begin{aligned} > EcuaTres := x \cdot \frac{d}{dx} u(x) - \left(u(x) \left(-1 + \frac{2}{3 - u(x)^2} \right) \right) = 0 \\ & EcuaTres := \left(\frac{d}{dx} u(x) \right) x - u(x) \left(-1 + \frac{2}{3 - u(x)^2} \right) = 0 \end{aligned} \quad (26)$$

$$\begin{aligned}
 & \text{> } P := 1; Q := -u \left(-1 + \frac{2}{3 - u^2} \right) \\
 & \qquad \qquad \qquad P := 1 \\
 & \qquad \qquad \qquad Q := -u \left(-1 + \frac{2}{-u^2 + 3} \right) \tag{27}
 \end{aligned}$$

$$\begin{aligned}
 & \text{> } R := x; S := 1 \\
 & \qquad \qquad \qquad R := x \\
 & \qquad \qquad \qquad S := 1 \tag{28}
 \end{aligned}$$

$$\begin{aligned}
 & \text{> } SolGral := \text{int}\left(\frac{P}{R}, x\right) + \text{int}\left(\frac{S}{Q}, u\right) = _CI \\
 & \qquad \qquad \qquad SolGral := \ln(x) - \ln(u - 1) + 3 \ln(u) - \ln(u + 1) = _CI \tag{29}
 \end{aligned}$$

$$\begin{aligned}
 & \text{> } SolGralCompleta := \text{simplify}\left(\text{subs}\left(u = \frac{y(x)}{x}, SolGral\right)\right) \\
 & \qquad \qquad \qquad SolGralCompleta := \ln(x) - \ln\left(\frac{y(x) - x}{x}\right) + 3 \ln\left(\frac{y(x)}{x}\right) - \ln\left(\frac{y(x) + x}{x}\right) = _CI \tag{30}
 \end{aligned}$$

$$\begin{aligned}
 & \text{> } DerSolGral := \text{simplify}(\text{isolate}(\text{diff}(SolGralCompleta, x), \text{diff}(y(x), x))) \\
 & \qquad \qquad \qquad DerSolGral := \frac{d}{dx} y(x) = -\frac{2 x y(x)}{y(x)^2 - 3 x^2} \tag{31}
 \end{aligned}$$

$$\begin{aligned}
 & \text{> } DerEcua := \text{isolate}(Ecua, \text{diff}(y(x), x)) \\
 & \qquad \qquad \qquad DerEcua := \frac{d}{dx} y(x) = \frac{2 x y(x)}{3 x^2 - y(x)^2} \tag{32}
 \end{aligned}$$

$$\begin{aligned}
 & \text{> } Comprobar := \text{simplify}(\text{rhs}(DerSolGral) - \text{rhs}(DerEcua)) = 0 \\
 & \qquad \qquad \qquad Comprobar := 0 = 0 \tag{33}
 \end{aligned}$$

> restart

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