

```

> restart
> Ecua := (x + y^2) - 2·x·y·y'=0
      Ecua := x + y(x)^2 - 2 x y(x) ( d/dx y(x) ) = 0 (1)
with(DEtools):
> odeadvisor(Ecua)
      [[_homogeneous, class G], _rational, _Bernoulli] (2)
> intfactor(Ecua)
      1/x^2 (3)

```

FACTOR INTEGRANTE

```

> M := x + y^2
      M := y^2 + x (4)
> N := -2·x·y
      N := -2 x y (5)
> DerMy := diff(M, y)
      DerMy := 2 y (6)
> DerNx := diff(N, x)
      DerNx := -2 y (7)
> DDMU := (DerMy - DerNx)/N
      DDMU := -2/x (8)
> FFInt := isolate(int(1/mu, mu) = int(DDMU, x), mu)
      FFInt := μ = 1/x^2 (9)
> rhs(FFInt)
      1/x^2 (10)
> MM := expand(rhs(FFInt)·M)
      MM := y^2/x^2 + 1/x (11)
> NN := expand(rhs(FFInt)·N)
      NN := -2 y/x (12)
> Comprobar := diff(MM, y) = diff(NN, x)
      Comprobar := 2 y/x^2 = 2 y/x^2 (13)
> IntMMx := int(MM, x)

```

$$IntMMx := \ln(x) - \frac{y^2}{x} \quad (14)$$

$$> SolGral := IntMMx + \text{int}((NN - \text{diff}(IntMMx, y)), y) = C[1]$$

$$SolGral := \ln(x) - \frac{y^2}{x} = C_1 \quad (15)$$

$$> Ecua$$

$$x + y(x)^2 - 2xy(x) \left( \frac{d}{dx} y(x) \right) = 0 \quad (16)$$

$$> SolGralFinal := \ln(x) - \frac{y(x)^2}{x} = C_1$$

$$SolGralFinal := \ln(x) - \frac{y(x)^2}{x} = C_1 \quad (17)$$

$$> DerSolGral := \text{simplify}(\text{isolate}(\text{diff}(SolGralFinal, x), \text{diff}(y(x), x)))$$

$$DerSolGral := \frac{d}{dx} y(x) = \frac{x + y(x)^2}{2xy(x)} \quad (18)$$

$$> DerEcua := \text{simplify}(\text{isolate}(Ecua, \text{diff}(y(x), x)))$$

$$DerEcua := \frac{d}{dx} y(x) = \frac{x + y(x)^2}{2xy(x)} \quad (19)$$

$$> \text{restart}$$

$$> Ecua := (2 \cdot x \cdot y^2 - 3 \cdot y^3) + (7 - 3 \cdot x \cdot y^2) \cdot y' = 0$$

$$Ecua := 2xy(x)^2 - 3y(x)^3 + (7 - 3xy(x)^2) \left( \frac{d}{dx} y(x) \right) = 0 \quad (20)$$

$$> \text{with}(DEtools):$$

$$> \text{odeadvisor}(Ecua)$$

$$[_{rational}] \quad (21)$$

$$> \text{intfactor}(Ecua)$$

$$\frac{1}{y(x)^2} \quad (22)$$

FACTOR INTEGRANTE

$$> M := 2 \cdot x \cdot y^2 - 3 \cdot y^3$$

$$M := 2xy^2 - 3y^3 \quad (23)$$

$$> N := 7 - 3 \cdot x \cdot y^2$$

$$N := -3xy^2 + 7 \quad (24)$$

$$> DerMy := \text{diff}(M, y)$$

$$DerMy := 4xy - 9y^2 \quad (25)$$

$$> DerNx := \text{diff}(N, x)$$

$$DerNx := -3y^2 \quad (26)$$

$$> DDMU := \text{simplify}\left(\frac{(DerNx - DerMy)}{M}\right)$$

$$DDMU := -\frac{2}{y} \quad (27)$$

$$> FFInt := isolate\left(int\left(\frac{1}{\mu}, \mu\right) = int(DDMU, y), \mu\right)$$

$$FFInt := \mu = \frac{1}{y^2} \quad (28)$$

$$> MM := expand(rhs(FFInt) \cdot M)$$

$$MM := 2x - 3y \quad (29)$$

$$> NN := expand(rhs(FFInt) \cdot N)$$

$$NN := -3x + \frac{7}{y^2} \quad (30)$$

$$> Comprobar := diff(MM, y) = diff(NN, x)$$

$$Comprobar := -3 = -3 \quad (31)$$

$$> IntMMx := int(MM, x)$$

$$IntMMx := x^2 - 3xy \quad (32)$$

$$> SolGral := IntMMx + int((NN - diff(IntMMx, y)), y) = C[1]$$

$$SolGral := x^2 - 3xy - \frac{7}{y} = C_1 \quad (33)$$

$$> Ecua$$

$$2xy(x)^2 - 3y(x)^3 + (7 - 3xy(x)^2) \left( \frac{d}{dx} y(x) \right) = 0 \quad (34)$$

$$> SolGralFinal := x^2 - 3xy(x) - \frac{7}{y(x)} = C_1$$

$$SolGralFinal := x^2 - 3xy(x) - \frac{7}{y(x)} = C_1 \quad (35)$$

$$> DerSolGral := simplify(isolate(diff(SolGralFinal, x), diff(y(x), x)))$$

$$DerSolGral := \frac{d}{dx} y(x) = \frac{(2x - 3y(x))y(x)^2}{3xy(x)^2 - 7} \quad (36)$$

$$> DerEcua := simplify(isolate(Ecua, diff(y(x), x)))$$

$$DerEcua := \frac{d}{dx} y(x) = \frac{(2x - 3y(x))y(x)^2}{3xy(x)^2 - 7} \quad (37)$$

$$> ComprobarDos := rhs(DerSolGral) - rhs(DerEcua) = 0$$

$$ComprobarDos := 0 = 0 \quad (38)$$

$$> restart$$

$$> Ecua := (x + y^2) - 2 \cdot x \cdot y \cdot y' = 0$$

$$Ecua := x + y(x)^2 - 2xy(x) \left( \frac{d}{dx} y(x) \right) = 0 \quad (39)$$

$$> M := (x + y^2)$$

$$M := y^2 + x \quad (40)$$

$$\begin{array}{l} \text{[> } N := -2 \cdot x \cdot y \\ \text{[= } N := -2 \, x \, y \end{array} \quad (41)$$

$$\begin{array}{l} \text{[> } Mlambda := (lambda \cdot y)^2 + lambda \cdot x \\ \text{[= } Mlambda := \lambda^2 y^2 + \lambda x \end{array} \quad (42)$$

La Ecuación no puede ser de coeficientes homogéneos dado que no puede cumplir la expresión previa.

Nos podemos olvidar de el odeadvisor erróneo y resolverla exclusivamente por factor integrante

[> *restart*

[>