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> restart
> Ecuacion := (1 - x·2·y(x)) + x·2·(y(x) - x)·diff(y(x), x) = 0
      Ecuacion := 1 - x2 y(x) + x2 (y(x) - x)  $\left(\frac{d}{dx} y(x)\right) = 0$  (1)
=
> with(DEtools) :
> odeadvisor(Ecuacion)
  [_rational, [_1st_order, _with_symmetry_[F(x),G(x)]], [_Abel, 2nd type, class B]] (2)
=
> intfactor(Ecuacion)
       $\frac{1}{x^2}$  (3)
=
> M := 1 - x2 y
      M := 1 - x2 y (4)
=
> N := x2 (y - x)
      N := x2 (y - x) (5)
=
> PartialMy := diff(M, y)
      PartialMy := -x2 (6)
=
> PartialNx := diff(N, x)
      PartialNx := 2 x (y - x) - x2 (7)
=
> G := simplify $\left(\frac{(PartialMy - PartialNx)}{N}\right)$ 
      G := -  $\frac{2}{x}$  (8)
=
> FactorIntegrante := isolate $\left(int\left(\frac{1}{mu}, mu\right) = int(G, x), mu\right)$ 
      FactorIntegrante :=  $\mu = \frac{1}{x^2}$  (9)
=
> EcuacionExacta := expand(rhs(FactorIntegrante)·Ecuacion)
      EcuacionExacta :=  $\frac{1}{x^2} - y(x) + \left(\frac{d}{dx} y(x)\right) y(x) - x \left(\frac{d}{dx} y(x)\right) = 0$  (10)
=
> odeadvisor(EcuacionExacta)
  [_exact, _rational, [_1st_order, _with_symmetry_[F(x),G(x)]], [_Abel, 2nd type, class B]] (11)
=
> restart
> Ecuacion := 2·x·y(x)·2 - 3·y(x)·3 + (7 - 3·x·y(x)·2)·diff(y(x), x) = 0
      Ecuacion := 2 x y(x)2 - 3 y(x)3 + (7 - 3 x y(x)2)  $\left(\frac{d}{dx} y(x)\right) = 0$  (12)
=
> with(DEtools) :
> odeadvisor(Ecuacion)
      [_rational] (13)
=
> FactInt := intfactor(Ecuacion)
      FactInt :=  $\frac{1}{y(x)^2}$  (14)
=
> M := 2·x·y·2 - 3·y·3

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$$M := 2xy^2 - 3y^3 \quad (15)$$

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

$$N := 7 - 3xy^2 \quad (16)$$

$$> \text{ParcialMy} := \text{diff}(M, y); \text{ParcialNx} := \text{diff}(N, x)$$

$$\text{ParcialMy} := 4xy - 9y^2$$

$$\text{ParcialNx} := -3y^2 \quad (17)$$

$$> H := \text{simplify}\left(\frac{(\text{ParcialNx} - \text{ParcialMy})}{M}\right)$$

$$H := -\frac{2}{y} \quad (18)$$

$$> \text{FactorIntegrante} := \text{isolate}\left(\text{int}\left(\frac{1}{\text{mu}}, \text{mu}\right) = \text{int}(H, y), \text{mu}\right)$$

$$\text{FactorIntegrante} := \mu = \frac{1}{y^2} \quad (19)$$

$$> MM := \text{expand}(\text{rhs}(\text{FactorIntegrante}) \cdot M); NN := \text{expand}(\text{rhs}(\text{FactorIntegrante}) \cdot N)$$

$$MM := 2x - 3y$$

$$NN := \frac{7}{y^2} - 3x \quad (20)$$

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

$$\text{Comprobacion} := 0 = 0 \quad (21)$$

$$> \text{EcuacionExacta} := \text{expand}(\text{FactInt} \cdot \text{Ecuacion})$$

$$\text{EcuacionExacta} := 2x - 3y(x) + \frac{7 \left(\frac{d}{dx} y(x) \right)}{y(x)^2} - 3 \left(\frac{d}{dx} y(x) \right) x = 0 \quad (22)$$

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

$$[_{\text{exact}}, _{\text{rational}}] \quad (23)$$

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