

> restart

>

$$-2xy + (3x^2 - y^2) \frac{dy}{dx} = 0$$

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

$$Ecuacion := -2xy(x) + (3x^2 - y(x)^2) \left(\frac{d}{dx} y(x) \right) = 0 \quad (1)$$

> with(DEtools) :

> odeadvisor(Ecuacion)

[[_homogeneous, class A], _rational, _dAlembert] (2)

> EcuacionSegunda := simplify(isolate(eval(subs(y(x) = u(x)·x, Ecuacion)), diff(u(x), x)))

$$EcuacionSegunda := \frac{d}{dx} u(x) = -\frac{u(x)(-1 + u(x)^2)}{x(-3 + u(x)^2)} \quad (3)$$

> $R := \frac{u(-1 + u^2)}{(-3 + u^2)}$

$$R := \frac{u(-1 + u^2)}{-3 + u^2} \quad (4)$$

> SolucionGeneralIndicada := Int(1/x, x) + Int(1/R, u) = C1

$$SolucionGeneralIndicada := \int \frac{1}{x} dx + \int \frac{-3 + u^2}{u(-1 + u^2)} du = C_1 \quad (5)$$

> SolucionGeneralIntermedia := int(1/x, x) + int(1/R, u) = C1

$$SolucionGeneralIntermedia := \ln(x) + \int \frac{-3 + u^2}{u(-1 + u^2)} du = C_1 \quad (6)$$

> isolate(expand(dsolve(Ecuacion)), _C1)

$$_C1 = \frac{y(x)^2 - x^2}{y(x)^3} \quad (7)$$

> restart

> Ecuacion := x·diff(y(x), x) = y(x) + sqrt(y(x)·2 - x·2)

$$Ecuacion := x \left(\frac{d}{dx} y(x) \right) = y(x) + \sqrt{y(x)^2 - x^2} \quad (8)$$

> with(DEtools) :

> odeadvisor(Ecuacion)

[[_homogeneous, class A], _rational, _dAlembert] (9)

> EcuacionSegunda := simplify(expand(isolate(eval(subs(y(x) = u(x)·x, Ecuacion)), diff(u(x), x))))

$$\text{EcuacionSegunda} := \frac{d}{dx} u(x) = \frac{\sqrt{x^2 (u(x)^2 - 1)}}{x^2} \quad (10)$$

$$> Q := \frac{\sqrt{(u^2 - 1)}}{x}$$

$$Q := \frac{\sqrt{u^2 - 1}}{x} \quad (11)$$

$$> R := \sqrt{u^2 - 1}$$

$$R := \sqrt{u^2 - 1} \quad (12)$$

$$> \text{SolucionGeneralIntermedia} := \text{int}\left(-\frac{1}{x}, x\right) + \text{int}\left(\frac{1}{R}, u\right) = C_1$$

$$\text{SolucionGeneralIntermedia} := -\ln(x) + \ln(u + \sqrt{u^2 - 1}) = C_1 \quad (13)$$

$$> \text{SolucionGeneralSegunda} := \text{simplify}(\exp(\text{lhs}(\text{SolucionGeneralIntermedia}))) = C_1$$

$$\text{SolucionGeneralSegunda} := \frac{u + \sqrt{u^2 - 1}}{x} = C_1 \quad (14)$$

$$> \text{SolucionGeneralFinal} := \text{expand}\left(\text{subs}\left(u = \frac{y}{x}, \text{SolucionGeneralSegunda}\right)\right)$$

$$\text{SolucionGeneralFinal} := \frac{y}{x^2} + \frac{\sqrt{\frac{y^2}{x^2} - 1}}{x} = C_1 \quad (15)$$

$$> \text{SolGral} := \text{simplify}(\text{lhs}(\text{SolucionGeneralFinal}) \cdot x \cdot 2) = \text{rhs}(\text{SolucionGeneralFinal}) \cdot x \cdot 2$$

$$\text{SolGral} := y + \sqrt{-\frac{-y^2 + x^2}{x^2}} \quad x = C_1 x^2 \quad (16)$$

$$> \text{SolGralDos} := \text{lhs}(\text{SolGral}) - y = \text{rhs}(\text{SolGral}) - y$$

$$\text{SolGralDos} := \sqrt{-\frac{-y^2 + x^2}{x^2}} \quad x = C_1 x^2 - y \quad (17)$$

$$> \text{SolGralTres} := \frac{\text{lhs}(\text{SolGralDos})}{x} = \frac{\text{rhs}(\text{SolGralDos})}{x}$$

$$\text{SolGralTres} := \sqrt{-\frac{-y^2 + x^2}{x^2}} = \frac{C_1 x^2 - y}{x} \quad (18)$$

$$> \text{SolGralCuatro} := \text{expand}(\text{lhs}(\text{SolGralTres}) \cdot 2) = \text{rhs}(\text{SolGralTres}) \cdot 2$$

$$\text{SolGralCuatro} := \frac{y^2}{x^2} - 1 = \frac{(C_1 x^2 - y)^2}{x^2} \quad (19)$$

$$> \text{SolGralCinco} := \text{expand}(\text{lhs}(\text{SolGralCuatro}) \cdot x \cdot 2) = \text{rhs}(\text{SolGralCuatro}) \cdot x \cdot 2$$

$$\text{SolGralCinco} := y^2 - x^2 = (C_1 x^2 - y)^2 \quad (20)$$

$$> \text{Solucion} := \text{isolate}(\text{dsolve}(\text{Ecuacion}), _C1)$$

$$Solucion := _C1 = \frac{y(x)}{x^2} + \frac{\sqrt{y(x)^2 - x^2}}{x^2} \quad (21)$$

> *SolGralSeis* := isolate(*SolGralCinco*, C_1)

$$SolGralSeis := C_1 = \frac{y + \sqrt{y^2 - x^2}}{x^2} \quad (22)$$

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