

> restart

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$$y(x) = C_1 e^{2x} + C_2 e^{-2x} + C_3 e^x$$

> SolucionGeneral := y(x) = C1·exp(2 x) + C2·exp(-2 x) + C3·exp(x);

$$\text{SolucionGeneral} := y(x) = C1 e^{2x} + C2 e^{-2x} + C3 e^x \quad (1)$$

> Sistema := diff(SolucionGeneral, x), diff(SolucionGeneral, x\$2), diff(SolucionGeneral, x\$3) : Sistema₁; Sistema₂; Sistema₃;

$$\frac{d}{dx} y(x) = 2 C1 e^{2x} - 2 C2 e^{-2x} + C3 e^x$$

$$\frac{d^2}{dx^2} y(x) = 4 C1 e^{2x} + 4 C2 e^{-2x} + C3 e^x$$

$$\frac{d^3}{dx^3} y(x) = 8 C1 e^{2x} - 8 C2 e^{-2x} + C3 e^x \quad (2)$$

> Solucion := solve({Sistema}, {C1, C2, C3}) : Solucion₁; Solucion₂; Solucion₃

$$C1 = -\frac{1}{8} \frac{-\left(\frac{d^2}{dx^2} y(x)\right) + 2\left(\frac{d}{dx} y(x)\right) - \left(\frac{d^3}{dx^3} y(x)\right)}{e^{2x}}$$

$$C2 = -\frac{1}{24} \frac{-3\left(\frac{d^2}{dx^2} y(x)\right) + 2\left(\frac{d}{dx} y(x)\right) + \frac{d^3}{dx^3} y(x)}{e^{-2x}}$$

$$C3 = \frac{1}{3} \frac{4\left(\frac{d}{dx} y(x)\right) - \left(\frac{d^3}{dx^3} y(x)\right)}{e^x} \quad (3)$$

> EcuacionIntermedia := subs(C1 = rhs(Solucion₁), C2 = rhs(Solucion₂), C3 = rhs(Solucion₃), SolucionGeneral);

$$\text{EcuacionIntermedia} := y(x) = \frac{1}{4} \frac{d^2}{dx^2} y(x) + \frac{d}{dx} y(x) - \frac{1}{4} \frac{d^3}{dx^3} y(x) \quad (4)$$

> EcuacionFinal := lhs(EcuacionIntermedia)·4 - rhs(EcuacionIntermedia)·4 = 0;

$$\text{EcuacionFinal} := 4 y(x) - \left(\frac{d^2}{dx^2} y(x)\right) - 4\left(\frac{d}{dx} y(x)\right) + \frac{d^3}{dx^3} y(x) = 0 \quad (5)$$

> SolGral := dsolve(EcuacionFinal);

$$\text{SolGral} := y(x) = _C1 e^{2x} + _C2 e^{-2x} + _C3 e^x \quad (6)$$

> restart

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

$$\begin{aligned} &> \text{Ecuacion} := 2 \cdot y(x) \cdot (\text{diff}(y(x), x) + 2) - x \cdot \text{diff}(y(x), x) \cdot 2 = 0 \\ &\quad \text{Ecuacion} := 2 y(x) \left(\frac{d}{dx} y(x) + 2 \right) - x \left(\frac{d}{dx} y(x) \right)^2 = 0 \end{aligned} \quad (7)$$

$$\begin{aligned} &> \text{SolGral} := y(x) = \frac{(C1 - x) \cdot 2}{C1}; \\ &\quad \text{SolGral} := y(x) = \frac{(-x + C1)^2}{C1} \end{aligned} \quad (8)$$

$$\begin{aligned} &> \text{comprobacion}_1 := \text{simplify}(\text{eval}(\text{subs}(y(x) = \text{rhs}(\text{SolGral}), \text{Ecuacion}))) \\ &\quad \text{comprobacion}_1 := 0 = 0 \end{aligned} \quad (9)$$

$$\begin{aligned} &> \text{SolPart}_1 := \text{subs}(C1 = 1, \text{SolGral}); \\ &\quad \text{SolPart}_1 := y(x) = (-x + 1)^2 \end{aligned} \quad (10)$$

$$\begin{aligned} &> \text{comprobacion}_2 := \text{simplify}(\text{eval}(\text{subs}(y(x) = \text{rhs}(\text{SolPart}_1), \text{Ecuacion}))) \\ &\quad \text{comprobacion}_2 := 0 = 0 \end{aligned} \quad (11)$$

$$\begin{aligned} &> \text{SolSing}_1 := y(x) = -4x; \\ &\quad \text{SolSing}_1 := y(x) = -4x \end{aligned} \quad (12)$$

$$\begin{aligned} &> \text{comprobacion}_3 := \text{simplify}(\text{eval}(\text{subs}(y(x) = \text{rhs}(\text{SolSing}_1), \text{Ecuacion}))) \\ &\quad \text{comprobacion}_3 := 0 = 0 \end{aligned} \quad (13)$$

$$\begin{aligned} &> \text{Solucion} := \text{dsolve}(\text{Ecuacion}); \\ &\quad \text{Solucion} := y(x) = 0, y(x) = -4x, y(x) = \frac{1}{2} \frac{x(-x + 2_C1)^2}{_C1^2 \left(-\frac{-x + 2_C1}{_C1} + 2 \right)} \end{aligned} \quad (14)$$

$$\begin{aligned} &> \text{simplify}(\text{Solucion}_3) \\ &\quad y(x) = \frac{1}{2} \frac{(-x + 2_C1)^2}{_C1} \end{aligned} \quad (15)$$

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