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> restart
> Ecua := 2*y(x)*(diff(y(x), x) + 2) - x*(diff(y(x), x)) - 2 = 0

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

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> Solucion := dsolve(Ecua)

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$$Solucion := y(x) = -4 x, y(x) = 0, y(x) = \frac{1}{2} \frac{x (-x + 2 _CI)^2}{_CI^2 \left(-\frac{-x + 2 _CI}{_CI} + 2 \right)} \quad (2)$$

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> Solucion[1]; Solucion[2]; Solucion[3]

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$$\begin{aligned} y(x) &= -4 x \\ y(x) &= 0 \\ y(x) &= \frac{1}{2} \frac{x (-x + 2 _CI)^2}{_CI^2 \left(-\frac{-x + 2 _CI}{_CI} + 2 \right)} \end{aligned} \quad (3)$$

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> SolucionParticular := subs(_CI=2, Solucion[3])

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$$SolucionParticular := y(x) = \frac{1}{4} (-x + 4)^2 \quad (4)$$

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> restart
> Ecua := diff(y(x), x) - \frac{y(x)}{x} = 0

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$$Ecua := \frac{d}{dx} y(x) - \frac{y(x)}{x} = 0 \quad (5)$$

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> SolucionGeneral := dsolve(Ecua)

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$$SolucionGeneral := y(x) = _CI x \quad (6)$$

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> restart
> Ecua := \left( \frac{x}{\sqrt{x \cdot 2 + y(x) \cdot 2}} + \frac{1}{x} + \frac{1}{y(x)} \right) + \left( \frac{y(x)}{\sqrt{x \cdot 2 + y(x) \cdot 2}} + \frac{1}{y(x)} - \frac{x}{y(x)^2} \right) \cdot \frac{d}{dx} y(x) = 0

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$$Ecua := \frac{x}{\sqrt{x^2 + y(x)^2}} + \frac{1}{x} + \frac{1}{y(x)} + \left(\frac{y(x)}{\sqrt{x^2 + y(x)^2}} + \frac{1}{y(x)} - \frac{x}{y(x)^2} \right) \left(\frac{d}{dx} y(x) \right) = 0 \quad (7)$$

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> with(DEtools):
> Tipo := odeadvisor(Ecua)

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$$Tipo := [_exact] \quad (8)$$

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> M := \frac{x}{\sqrt{x \cdot 2 + y \cdot 2}} + \frac{1}{x} + \frac{1}{y}

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$$M := \frac{x}{\sqrt{x^2 + y^2}} + \frac{1}{x} + \frac{1}{y} \quad (9)$$

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> N := \frac{y}{\sqrt{x \cdot 2 + y \cdot 2}} + \frac{1}{y} - \frac{x}{y \cdot 2}

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$$N := \frac{y}{\sqrt{x^2 + y^2}} + \frac{1}{y} - \frac{x}{y^2} \quad (10)$$

> $IntMx := int(M, x)$

$$IntMx := \sqrt{x^2 + y^2} + \ln(x) + \frac{x}{y} \quad (11)$$

> $DerIntMxY := diff(IntMx, y)$

$$DerIntMxY := \frac{y}{\sqrt{x^2 + y^2}} - \frac{x}{y^2} \quad (12)$$

> $SolucionGeneral := IntMx + int((N - DerIntMxY), y) = C[1]$

$$SolucionGeneral := \sqrt{x^2 + y^2} + \ln(x) + \frac{x}{y} + \ln(y) = C_1 \quad (13)$$

> $Ecua$

$$\frac{x}{\sqrt{x^2 + y(x)^2}} + \frac{1}{x} + \frac{1}{y(x)} + \left(\frac{y(x)}{\sqrt{x^2 + y(x)^2}} + \frac{1}{y(x)} - \frac{x}{y(x)^2} \right) \left(\frac{d}{dx} y(x) \right) = 0 \quad (14)$$

> $SolGral := dsolve(Ecua)$

$$SolGral := \sqrt{x^2 + y(x)^2} + \ln(x) + \frac{x}{y(x)} + \ln(y(x)) + _C1 = 0 \quad (15)$$

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

$$DerEcua := \frac{d}{dx} y(x) = \frac{-\frac{x}{\sqrt{x^2 + y(x)^2}} - \frac{1}{x} - \frac{1}{y(x)}}{\frac{y(x)}{\sqrt{x^2 + y(x)^2}} + \frac{1}{y(x)} - \frac{x}{y(x)^2}} \quad (16)$$

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

$$DerSolGral := \frac{d}{dx} y(x) = \frac{\left(-\frac{1}{x} - \frac{1}{y(x)} \right) \sqrt{x^2 + y(x)^2} y(x)^2 - y(x)^2 x}{y(x)^3 + \sqrt{x^2 + y(x)^2} y(x) - \sqrt{x^2 + y(x)^2} x} \quad (17)$$

> $Comprobacion := simplify(rhs(DerEcua) - rhs(DerSolGral)) = 0$

$$Comprobacion := 0 = 0 \quad (18)$$

> $restart$

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

$$Ecua := 2 x y(x)^2 - 3 y(x)^3 + (7 - 3 x y(x)^2) \left(\frac{d}{dx} y(x) \right) = 0 \quad (19)$$

> $with(DEtools):$

> $Tipo := odeadvisor(Ecua)$

$$Tipo := [_rational] \quad (20)$$

> $intfactor(Ecua)$

$$\frac{1}{y(x)^2} \quad (21)$$

> $FactInt := \frac{1}{y^2}$

$$FactInt := \frac{1}{y^2} \quad (22)$$

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

(23)

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

$$> N := 7 - 3xy^2$$

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

$$> \text{CompUno} := \text{simplify}(\text{diff}(M, y) - \text{diff}(N, x)) = 0$$

$$\text{CompUno} := 4xy - 6y^2 = 0 \quad (25)$$

$$> MM := \text{simplify}(M \cdot \text{FactInt})$$

$$MM := 2x - 3y \quad (26)$$

$$> NN := \text{expand}(N \cdot \text{FactInt})$$

$$NN := -3x + \frac{7}{y^2} \quad (27)$$

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

$$\text{CompDos} := 0 = 0 \quad (28)$$

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

$$\text{SolGral} := x^2 - 3xy - \frac{7}{y} = C_1 \quad (29)$$

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

$$SG := x^2 - 3xy(x) - \frac{7}{y(x)} = C_1 \quad (30)$$

$$> \text{DerSG} := \text{isolate}(\text{diff}(SG, x), \text{diff}(y(x), x))$$

$$\text{DerSG} := \frac{d}{dx} y(x) = \frac{-2x + 3y(x)}{-3x + \frac{7}{y(x)^2}} \quad (31)$$

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

$$\text{DerEcua} := \frac{d}{dx} y(x) = \frac{-2xy(x)^2 + 3y(x)^3}{7 - 3xy(x)^2} \quad (32)$$

$$> \text{CompTres} := \text{simplify}(\text{rhs}(\text{DerSG}) - \text{rhs}(\text{DerEcua})) = 0$$

$$\text{CompTres} := 0 = 0 \quad (33)$$

$$> \text{restart}$$

$$> \text{Ecua} := (3 \cdot y(x) \cdot 2 - x) + (2 \cdot y(x) \cdot 3 - 6 \cdot x \cdot y(x)) \cdot \text{diff}(y(x), x) = 0$$

$$\text{Ecua} := 3y(x)^2 - x + (2y(x)^3 - 6xy(x)) \left(\frac{d}{dx} y(x) \right) = 0 \quad (34)$$

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

$$> \text{Tipo} := \text{odeadvisor}(\text{Ecua})$$

$$\text{Tipo} := [[_homogeneous, \text{class } G], _rational] \quad (35)$$

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

$$\frac{1}{(y(x)^2 - x)(y(x)^2 + x)} \quad (36)$$

$$> \text{FactInt} := \frac{1}{(y^2 - x)(y^2 + x)}$$

$$\text{FactInt} := \frac{1}{(y^2 - x)(y^2 + x)} \quad (37)$$

>	$M := 3 y^2 - x$		
		$M := 3 y^2 - x$	(38)
>	$N := 2 y^3 - 6 x y$		
		$N := 2 y^3 - 6 x y$	(39)
>	$ComprUno := \text{simplify}(\text{diff}(M, y) - \text{diff}(N, x)) = 0$		
		$ComprUno := 12 y = 0$	(40)
>	$MM := M \cdot \text{FactInt}$		
		$MM := \frac{3 y^2 - x}{(y^2 - x)(y^2 + x)}$	(41)
>	$NN := N \cdot \text{FactInt}$		
		$NN := \frac{2 y^3 - 6 x y}{(y^2 - x)(y^2 + x)}$	(42)
>	$ComprDos := \text{simplify}(\text{diff}(MM, y) - \text{diff}(NN, x)) = 0$		
		$ComprDos := 0 = 0$	(43)
>	$SolGral := \text{int}(MM, x) + \text{int}((NN - \text{diff}(\text{int}(MM, x), y)), y) = C[1]$		
		$SolGral := -\ln(-y^2 + x) + 2 \ln(y^2 + x) = C_1$	(44)
>			