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> restart
> Ecua := y' + p(x)·y = 0

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$$Ecua := \frac{d}{dx} y(x) + p(x) y(x) = 0 \quad (1)$$

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> SolGral := dsolve(Ecua)

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$$SolGral := y(x) = c_1 e^{\int -p(x) dx} \quad (2)$$

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> with(DEtools) :
> odeadvisor(Ecua)

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$$[_separable] \quad (3)$$

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> intfactor(Ecua)

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$$e^{\int p(x) dx} \quad (4)$$

```

> restart
> Ecua := y' + y·cos(x) = 0

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

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> p := cos(x)

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$$p := \cos(x) \quad (6)$$

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> SolGral := y(x) = _C1·exp( -int( p, x ) )

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$$SolGral := y(x) = _C1 e^{-\sin(x)} \quad (7)$$

```

> restart
Ecuaciones Diferenciales Ordinarias (primer orden) Lineales Coeficientes-Variables No-Homogeneas
EDO(1)LcvNH
> Ecua := y' + (sin(x) - x·cos(x)) / (x·sin(x)) · y = (sin(x)·cos(x) - x) / (x·sin(x))

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$$Ecua := \frac{d}{dx} y(x) + \frac{(\sin(x) - x \cos(x))}{x \sin(x)} y(x) = \frac{\sin(x) \cos(x) - x}{x \sin(x)} \quad (8)$$

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> p := (sin(x) - x cos(x)) / (x sin(x))

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$$p := \frac{\sin(x) - x \cos(x)}{x \sin(x)} \quad (9)$$

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> q := (sin(x) cos(x) - x) / (x sin(x))

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$$q := \frac{\sin(x) \cos(x) - x}{x \sin(x)} \quad (10)$$

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> IntPx := int( p, x )

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$$IntPx := \ln(x) - \ln(\sin(x)) \quad (11)$$

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> SolGral := expand(simplify(y(x) = _C1·exp( -IntPx ) + exp( -IntPx )·int( exp( IntPx )·q, x ) ) )

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$$SolGral := y(x) = \sin(x) \cot(x) + \frac{\sin(x) _C1}{x} \quad (12)$$

$$\begin{aligned} &> \text{Ecua} \\ &\quad \frac{d}{dx} y(x) + \frac{(\sin(x) - x \cos(x)) y(x)}{x \sin(x)} = \frac{\sin(x) \cos(x) - x}{x \sin(x)} \end{aligned} \quad (13)$$

$$\begin{aligned} &> \text{Comprobar} := \text{simplify}(\text{eval}(\text{subs}(y(x) = \text{rhs}(\text{SolGral}), \text{lhs}(\text{Ecua}) - \text{rhs}(\text{Ecua}) = 0))) \\ &\quad \text{Comprobar} := 0 = 0 \end{aligned} \quad (14)$$

restart

$$\begin{aligned} &> \text{Ecua} := y'' - 5 \cdot y' + 6 \cdot y = 0 \\ &\quad \text{Ecua} := \frac{d^2}{dx^2} y(x) - 5 \frac{d}{dx} y(x) + 6 y(x) = 0 \end{aligned} \quad (15)$$

EDO(2)LccH

$$\begin{aligned} &> \text{EcuaCarac} := m^2 - 5 \cdot m + 6 = 0 \\ &\quad \text{EcuaCarac} := m^2 - 5 m + 6 = 0 \end{aligned} \quad (16)$$

$$\begin{aligned} &> \text{Raiz} := \text{solve}(\text{EcuaCarac}) \\ &\quad \text{Raiz} := 3, 2 \end{aligned} \quad (17)$$

$$\begin{aligned} &> \text{yy}[1] := \exp(\text{Raiz}[1] \cdot x) \\ &\quad \text{yy}_1 := e^{3x} \end{aligned} \quad (18)$$

$$\begin{aligned} &> \text{yy}[2] := \exp(\text{Raiz}[2] \cdot x) \\ &\quad \text{yy}_2 := e^{2x} \end{aligned} \quad (19)$$

$$\begin{aligned} &> \text{SolGral} := y(x) = _C1 \cdot \text{yy}[1] + _C2 \cdot \text{yy}[2] \\ &\quad \text{SolGral} := y(x) = _C1 e^{3x} + _C2 e^{2x} \end{aligned} \quad (20)$$

$\text{with}(\text{linalg}) :$

$$\begin{aligned} &> \text{WW} := \text{wronskian}([\text{yy}[1], \text{yy}[2]], x) \\ &\quad \text{WW} := \begin{bmatrix} e^{3x} & e^{2x} \\ 3 e^{3x} & 2 e^{2x} \end{bmatrix} \end{aligned} \quad (21)$$

$$\begin{aligned} &> \text{Comprobar} := \det(\text{WW}) \neq 0 \\ &\quad \text{Comprobar} := -e^{3x} e^{2x} \neq 0 \end{aligned} \quad (22)$$

$$\begin{aligned} &> \text{Ecua} \\ &\quad \frac{d^2}{dx^2} y(x) - 5 \frac{d}{dx} y(x) + 6 y(x) = 0 \end{aligned} \quad (23)$$

$$\begin{aligned} &> \text{SolGral} \\ &\quad y(x) = _C1 e^{3x} + _C2 e^{2x} \end{aligned} \quad (24)$$

$$\begin{aligned} &> \text{comprobarDos} := \text{eval}(\text{subs}(y(x) = \text{rhs}(\text{SolGral}), \text{Ecua})) \\ &\quad \text{comprobarDos} := 0 = 0 \end{aligned} \quad (25)$$

restart

$$\begin{aligned} &> \text{SolGral} := y(x) = _C1 \cdot \exp(x) + _C2 \cdot \exp(-x) \\ &\quad \text{SolGral} := y(x) = _C1 e^x + _C2 e^{-x} \end{aligned} \quad (26)$$

$$> \text{EcuaCarac} := \text{expand}((m - 1) \cdot (m + 1)) = 0$$

	$EcuaCarac := m^2 - 1 = 0$	(27)
=		
>	$Ecua := y'' - y = 0$	
	$Ecua := \frac{d^2}{dx^2} y(x) - y(x) = 0$	(28)
=		
>	$SolGral$	
	$y(x) = _C1 e^x + _C2 e^{-x}$	(29)
=		
>	$Comprobar := eval(subs(y(x) = rhs(SolGral), lhs(Ecua) - rhs(Ecua) = 0))$	
	$Comprobar := 0 = 0$	(30)
=		
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