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> restart
> Sistema := diff(x[1](t), t) = 2·x[1](t) + 3·x[2](t), diff(x[2](t), t) = x[1](t) + 4·x[2](t) :
    Sistema[1]; Sistema[2]

$$\frac{d}{dt} x_1(t) = 2x_1(t) + 3x_2(t)$$


$$\frac{d}{dt} x_2(t) = x_1(t) + 4x_2(t) \quad (1)$$

> Xcero := x[1](0) = -3, x[2](0) = 2 : Xcero[1]; Xcero[2]

$$x_1(0) = -3$$


$$x_2(0) = 2 \quad (2)$$

> SolucionGeneral := dsolve({Sistema})

$$\text{SolucionGeneral} := \left\{ x_1(t) = c_1 e^{5t} + c_2 e^t, x_2(t) = c_1 e^{5t} - \frac{c_2 e^t}{3} \right\} \quad (3)$$

> SolucionParticular := dsolve({Xcero, Sistema})

$$\text{SolucionParticular} := \left\{ x_1(t) = \frac{3 e^{5t}}{4} - \frac{15 e^t}{4}, x_2(t) = \frac{3 e^{5t}}{4} + \frac{5 e^t}{4} \right\} \quad (4)$$

> ComprobarCondIniUno := simplify(subs(t=0, SolucionParticular[1]))

$$\text{ComprobarCondIniUno} := x_1(0) = -3 \quad (5)$$

> ComprobarCondIniDos := simplify(subs(t=0, SolucionParticular[2]))

$$\text{ComprobarCondIniDos} := x_2(0) = 2 \quad (6)$$

> ComprobarTres := eval(subs(x[1](t) = rhs(SolucionGeneral[1]), x[2](t)
    = rhs(SolucionGeneral[2]), lhs(Sistema[1]) - rhs(Sistema[1]) = 0))

$$\text{ComprobarTres} := 0 = 0 \quad (7)$$

> ComprobarCuatro := eval(subs(x[1](t) = rhs(SolucionGeneral[1]), x[2](t)
    = rhs(SolucionGeneral[2]), lhs(Sistema[2]) - rhs(Sistema[2]) = 0))

$$\text{ComprobarCuatro} := 0 = 0 \quad (8)$$

> restart
> Sistema := diff(x[1](t), t) = x[1](t) + x[2](t), diff(x[2](t), t) = -x[1](t) + x[2](t) :
    Sistema[1]; Sistema[2]

$$\frac{d}{dt} x_1(t) = x_1(t) + x_2(t)$$


$$\frac{d}{dt} x_2(t) = -x_1(t) + x_2(t) \quad (9)$$

> SolucionGeneral := dsolve({Sistema}); SolucionGeneral[1]; SolucionGeneral[2];

$$\text{SolucionGeneral} := \left\{ x_1(t) = e^t (c_2 \cos(t) + c_1 \sin(t)), x_2(t) = e^t (\cos(t) c_1 - \sin(t) c_2) \right\}$$


$$x_1(t) = e^t (c_2 \cos(t) + c_1 \sin(t))$$


$$x_2(t) = e^t (\cos(t) c_1 - \sin(t) c_2) \quad (10)$$

> ComprobarUno := simplify(eval(subs(x[1](t) = rhs(SolucionGeneral[1]), x[2](t)
    = rhs(SolucionGeneral[2]), lhs(Sistema[1]) - rhs(Sistema[1]) = 0))

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$$\text{ComprobarUno} := 0 = 0 \quad (11)$$

$$\begin{aligned} &> \text{ComprobarDos} := \text{simplify}(\text{eval}(\text{subs}(x[1](t) = \text{rhs}(\text{SolucionGeneral}[1]), x[2](t) \\ &= \text{rhs}(\text{SolucionGeneral}[2]), \text{lhs}(\text{Sistema}[2]) - \text{rhs}(\text{Sistema}[2]) = 0))) \\ &\text{ComprobarDos} := 0 = 0 \end{aligned} \quad (12)$$

> restart

$$\begin{aligned} &> \text{Ecua} := y'' + y = -\cos(x) \\ &\text{Ecua} := \frac{d^2}{dx^2} y(x) + y(x) = -\cos(x) \end{aligned} \quad (13)$$

$$\begin{aligned} &> \text{EcuaHom} := \text{lhs}(\text{Ecua}) = 0 \\ &\text{EcuaHom} := \frac{d^2}{dx^2} y(x) + y(x) = 0 \end{aligned} \quad (14)$$

$$\begin{aligned} &> Q := \text{rhs}(\text{Ecua}) \\ &Q := -\cos(x) \end{aligned} \quad (15)$$

$$\begin{aligned} &> \text{EcuaCarac} := m^2 + 1 = 0 \\ &\text{EcuaCarac} := m^2 + 1 = 0 \end{aligned} \quad (16)$$

$$\begin{aligned} &> \text{Raiz} := \text{solve}(\text{EcuaCarac}) \\ &\text{Raiz} := 1, -1 \end{aligned} \quad (17)$$

$$\begin{aligned} &> yy[1] := \cos(\text{Im}(\text{Raiz}[1]) \cdot x) \\ &yy_1 := \cos(x) \end{aligned} \quad (18)$$

$$\begin{aligned} &> yy[2] := \sin(\text{Im}(\text{Raiz}[1]) \cdot x) \\ &yy_2 := \sin(x) \end{aligned} \quad (19)$$

> with(linalg) :

$$\begin{aligned} &> WW := \text{wronskian}([yy[1], yy[2]], x) \\ &WW := \begin{bmatrix} \cos(x) & \sin(x) \\ -\sin(x) & \cos(x) \end{bmatrix} \end{aligned} \quad (20)$$

$$\begin{aligned} &> BB := \text{array}([0, Q]) \\ &BB := \begin{bmatrix} 0 & -\cos(x) \end{bmatrix} \end{aligned} \quad (21)$$

$$\begin{aligned} &> \text{Para} := \text{simplify}(\text{linsolve}(WW, BB)) \\ &\text{Para} := \begin{bmatrix} \cos(x) \sin(x) & -\cos(x)^2 \end{bmatrix} \end{aligned} \quad (22)$$

$$\begin{aligned} &> \text{Aprima} := \text{Para}[1]; \text{Bprima} := \text{Para}[2] \\ &\text{Aprima} := \cos(x) \sin(x) \\ &\text{Bprima} := -\cos(x)^2 \end{aligned} \quad (23)$$

$$\begin{aligned} &> \text{SolGeneral} := y(x) = \text{simplify}((\text{int}(\text{Aprima}, x) + _C1) \cdot yy[1] + (\text{int}(\text{Bprima}, x) + _C2) \\ &\cdot yy[2]) \\ &\text{SolGeneral} := y(x) = \frac{(2_C2 - x) \sin(x)}{2} + \cos(x) _C1 \end{aligned} \quad (24)$$

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