

> restart

> Sistema := diff(x[1](t), t) = 2·x[1](t) + 3·x[2](t), diff(x[2](t), t) = 4·x[1](t) + 5·x[2](t) :
Sistema[1]; Sistema[2]

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

$$\frac{d}{dt} x_2(t) = 4 x_1(t) + 5 x_2(t) \quad (1)$$

> Var[1] := isolate(Sistema[2], x[1](t))

$$Var_1 := x_1(t) = \frac{\frac{d}{dt} x_2(t)}{4} - \frac{5 x_2(t)}{4} \quad (2)$$

> Var[2] := eval(subs(x[1](t) = rhs(Var[1]), Sistema[1]))

$$Var_2 := \frac{\frac{d^2}{dt^2} x_2(t)}{4} - \frac{5 \frac{d}{dt} x_2(t)}{4} = \frac{\frac{d}{dt} x_2(t)}{2} + \frac{x_2(t)}{2} \quad (3)$$

> Var[3] := 4·(lhs(Var[2]) - rhs(Var[2])) = 0

$$Var_3 := \frac{d^2}{dt^2} x_2(t) - 7 \frac{d}{dt} x_2(t) - 2 x_2(t) = 0 \quad (4)$$

> EcuaCarac := m² - 7·m - 2 = 0

$$EcuaCarac := m^2 - 7 m - 2 = 0 \quad (5)$$

> Raiz := solve(EcuaCarac); evalf(Raiz[1], 3); evalf(Raiz[2], 3)

$$Raiz := \frac{7}{2} + \frac{\sqrt{57}}{2}, \frac{7}{2} - \frac{\sqrt{57}}{2} \\ 7.28 \\ -0.28 \quad (6)$$

> yy[1] := exp(Raiz[1]·t)

$$yy_1 := e^{\left(\frac{7}{2} + \frac{\sqrt{57}}{2}\right)t} \quad (7)$$

> yy[2] := exp(Raiz[2]·t)

$$yy_2 := e^{\left(\frac{7}{2} - \frac{\sqrt{57}}{2}\right)t} \quad (8)$$

> SolGral[2] := x[2](t) = C[1]·yy[1] + C[2]·yy[2]; evalf(%, 3)

$$SolGral_2 := x_2(t) = C_1 e^{\left(\frac{7}{2} + \frac{\sqrt{57}}{2}\right)t} + C_2 e^{\left(\frac{7}{2} - \frac{\sqrt{57}}{2}\right)t} \\ x_2(t) = C_1 e^{7.28 t} + C_2 e^{-0.28 t} \quad (9)$$

> SolGral[1] := simplify(eval(subs(SolGral[2], Var[1]))); evalf(%, 3)

$$SolGral_1 := x_1(t) = -\frac{C_2 (\sqrt{57} + 3) e^{-\frac{(-7 + \sqrt{57})t}{2}}}{8} + \frac{C_1 e^{\frac{(7 + \sqrt{57})t}{2}} (\sqrt{57} - 3)}{8}$$

$$x_1(t) = -1.32 C_2 e^{-0.275 t} + 0.569 C_1 e^{7.30 t} \quad (10)$$

> Sistema[1]

$$\frac{d}{dt} x_1(t) = 2 x_1(t) + 3 x_2(t) \quad (11)$$

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

$$\text{ComprobarUno} := 0 = 0 \quad (12)$$

> Sistema[1]; Sistema[2]

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

$$\frac{d}{dt} x_2(t) = 4 x_1(t) + 5 x_2(t) \quad (13)$$

> SolGral := dsolve({Sistema[1], Sistema[2]})

$$\text{SolGral} := \left\{ x_1(t) = c_1 e^{\frac{(7+\sqrt{57})t}{2}} + c_2 e^{-\frac{(-7+\sqrt{57})t}{2}}, x_2(t) = -\frac{c_2 e^{-\frac{(-7+\sqrt{57})t}{2}} \sqrt{57}}{6} + \frac{c_1 e^{\frac{(7+\sqrt{57})t}{2}} \sqrt{57}}{6} + \frac{c_2 e^{-\frac{(-7+\sqrt{57})t}{2}}}{2} + \frac{c_1 e^{\frac{(7+\sqrt{57})t}{2}}}{2} \right\} \quad (14)$$

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