> *restart*

> $Sistema := diff(x[1](t), t) = 2 \cdot x[1](t) + 3 \cdot x[2](t), diff(x[2](t), t) = x[1](t) + 4 \cdot x[2](t)$:
$Sistema[1]; Sistema[2]$

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

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

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

$$x_1(t) = c_1\, e^{5t} + c_2\, e^{t}$$

$$x_2(t) = c_1\, e^{5t} - \frac{c_2\, e^{t}}{3} \tag{2}$$

> *restart*

> $Sistema := diff(y[1](t), t) = y[2](t), diff(y[2](t), t) = y[3](t), diff(y[3](t), t) = 2 \cdot y[1](t)$
$- 4 \cdot y[2](t) + 6 \cdot y[3](t)$: $Sistema[1]; Sistema[2]; Sistema[3]$

$$\frac{d}{dt} y_1(t) = y_2(t)$$

$$\frac{d}{dt} y_2(t) = y_3(t)$$

$$\frac{d}{dt} y_3(t) = 2\, y_1(t) - 4\, y_2(t) + 6\, y_3(t) \tag{3}$$

> $SolGralSist := dsolve(\{Sistema[1], Sistema[2], Sistema[3]\})$: $simplify(evalf(SolGralSist[1], 3))$; $simplify(evalf(SolGralSist[2], 3))$: $simplify(evalf(SolGralSist[3], 3))$:

$$y_1(t) = \left(\left(0.90629\, c_3 + 1.3673\, c_2 \right) \cos(0.505\, t) + \left(1.3673\, c_3 - 0.90629\, c_2 \right) \sin(0.505\, t) \right) e^{0.342\, t} \tag{4}$$
$$+ 0.192\, c_1\, e^{5.33\, t}$$

> $Ecua := diff(y(t), t\$3) - 6 \cdot diff(y(t), t\$2) + 4 \cdot diff(y(t), t) - 2 \cdot y(t) = 0$

$$Ecua := \frac{d^3}{dt^3} y(t) - 6\, \frac{d^2}{dt^2} y(t) + 4\, \frac{d}{dt} y(t) - 2\, y(t) = 0 \tag{5}$$

> $SolGral := simplify(evalf(dsolve(Ecua), 3))$

$$SolGral := y(t) = c_1\, e^{5.33\, t} - 1.\, c_2\, e^{0.342\, t} \sin(0.508\, t) + c_3\, e^{0.342\, t} \cos(0.508\, t) \tag{6}$$

> *restart*

> $AA := array([[2, 3], [1, 4]])$

$$AA := \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix} \tag{7}$$

> $with(linalg)$:

> $MatExp := exponential(AA, t)$

$$\tag{8}$$

$$MatExp := \begin{bmatrix} \dfrac{3\,e^{t}}{4} + \dfrac{e^{5\,t}}{4} & \dfrac{3\,e^{5\,t}}{4} - \dfrac{3\,e^{t}}{4} \\[2mm] \dfrac{e^{5\,t}}{4} - \dfrac{e^{t}}{4} & \dfrac{e^{t}}{4} + \dfrac{3\,e^{5\,t}}{4} \end{bmatrix}$$

(8)

> $Identidad := map(rcurry(eval, t ='0'), MatExp)$

$$Identidad := \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

(9)

> $Inversa := map(rcurry(eval, t ='-t'), MatExp)$

$$Inversa := \begin{bmatrix} \dfrac{3\,e^{-t}}{4} + \dfrac{e^{-5\,t}}{4} & \dfrac{3\,e^{-5\,t}}{4} - \dfrac{3\,e^{-t}}{4} \\[2mm] \dfrac{e^{-5\,t}}{4} - \dfrac{e^{-t}}{4} & \dfrac{e^{-t}}{4} + \dfrac{3\,e^{-5\,t}}{4} \end{bmatrix}$$

(10)

> $IdentidadDos := simplify(evalm(MatExp \,\&*\, Inversa))$

$$IdentidadDos := \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

(11)

> $DerMatExp := map(diff, MatExp, t)$

$$DerMatExp := \begin{bmatrix} \dfrac{3\,e^{t}}{4} + \dfrac{5\,e^{5\,t}}{4} & \dfrac{15\,e^{5\,t}}{4} - \dfrac{3\,e^{t}}{4} \\[2mm] \dfrac{5\,e^{5\,t}}{4} - \dfrac{e^{t}}{4} & \dfrac{e^{t}}{4} + \dfrac{15\,e^{5\,t}}{4} \end{bmatrix}$$

(12)

> $ProdAAMatExp := evalm(AA \,\&*\, MatExp)$

$$ProdAAMatExp := \begin{bmatrix} \dfrac{3\,e^{t}}{4} + \dfrac{5\,e^{5\,t}}{4} & \dfrac{15\,e^{5\,t}}{4} - \dfrac{3\,e^{t}}{4} \\[2mm] \dfrac{5\,e^{5\,t}}{4} - \dfrac{e^{t}}{4} & \dfrac{e^{t}}{4} + \dfrac{15\,e^{5\,t}}{4} \end{bmatrix}$$

(13)

> $IntMatExp := map(int, MatExp, t)$

$$IntMatExp := \begin{bmatrix} \dfrac{3\,e^{t}}{4} + \dfrac{e^{5\,t}}{20} & -\dfrac{3\,e^{t}}{4} + \dfrac{3\,e^{5\,t}}{20} \\[2mm] -\dfrac{e^{t}}{4} + \dfrac{e^{5\,t}}{20} & \dfrac{3\,e^{5\,t}}{20} + \dfrac{e^{t}}{4} \end{bmatrix}$$

(14)

>