

```

> restart
> Sistema := diff(x(t), t) = 3·x(t) + 4·y(t), diff(y(t), t) = 2·x(t) + 5·y(t) : Sistema1; Sistema2

```

$$\begin{aligned}\frac{d}{dt} x(t) &= 3 x(t) + 4 y(t) \\ \frac{d}{dt} y(t) &= 2 x(t) + 5 y(t)\end{aligned}\tag{1}$$

```

> Solucion := dsolve({Sistema}) : Solucion1; Solucion2

```

$$\begin{aligned}x(t) &= _C1 e^{7t} + _C2 e^t \\ y(t) &= _C1 e^{7t} - \frac{1}{2} _C2 e^t\end{aligned}\tag{2}$$

```

> Condiciones := x(0) = 5, y(0) = -3

```

$$\text{Condiciones} := x(0) = 5, y(0) = -3\tag{3}$$

```

> SolPart := dsolve({Sistema, Condiciones}) : SolPart1; SolPart2

```

$$\begin{aligned}x(t) &= -\frac{1}{3} e^{7t} + \frac{16}{3} e^t \\ y(t) &= -\frac{1}{3} e^{7t} - \frac{8}{3} e^t\end{aligned}\tag{4}$$

```

> AA := array([ [3, 4], [2, 5] ])

```

$$AA := \begin{bmatrix} 3 & 4 \\ 2 & 5 \end{bmatrix}\tag{5}$$

```

> with(linalg) :
> MatExp := exponential(AA, t)

```

$$\text{MatExp} := \begin{bmatrix} \frac{2}{3} e^t + \frac{1}{3} e^{7t} & \frac{2}{3} e^{7t} - \frac{2}{3} e^t \\ \frac{1}{3} e^{7t} - \frac{1}{3} e^t & \frac{1}{3} e^t + \frac{2}{3} e^{7t} \end{bmatrix}\tag{6}$$

```

> MatExp[1, 2]

```

$$\frac{2}{3} e^{7t} - \frac{2}{3} e^t\tag{7}$$

```

> Xcero := array([5, -3])

```

$$Xcero := \begin{bmatrix} 5 & -3 \end{bmatrix}\tag{8}$$

```

> Sol := evalm(MatExp &* Xcero) : x(t) = simplify(Sol1); y(t) = simplify(Sol2)

```

$$\begin{aligned}x(t) &= -\frac{1}{3} e^{7t} + \frac{16}{3} e^t \\ y(t) &= -\frac{1}{3} e^{7t} - \frac{8}{3} e^t\end{aligned}\tag{9}$$

```

> SolPart1; SolPart2

```

$$x(t) = -\frac{1}{3} e^{7t} + \frac{16}{3} e^t$$

$$y(t) = -\frac{1}{3} e^{7t} - \frac{8}{3} e^t \quad (10)$$

> evalm(MatExp)

$$\begin{bmatrix} \frac{2}{3} e^t + \frac{1}{3} e^{7t} & \frac{2}{3} e^{7t} - \frac{2}{3} e^t \\ \frac{1}{3} e^{7t} - \frac{1}{3} e^t & \frac{1}{3} e^t + \frac{2}{3} e^{7t} \end{bmatrix} \quad (11)$$

> evalm(AA)

$$\begin{bmatrix} 3 & 4 \\ 2 & 5 \end{bmatrix} \quad (12)$$

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

$$DerMatExp := \begin{bmatrix} \frac{2}{3} e^t + \frac{7}{3} e^{7t} & \frac{14}{3} e^{7t} - \frac{2}{3} e^t \\ \frac{7}{3} e^{7t} - \frac{1}{3} e^t & \frac{1}{3} e^t + \frac{14}{3} e^{7t} \end{bmatrix} \quad (13)$$

> evalm(AA &* MatExp)

$$\begin{bmatrix} \frac{2}{3} e^t + \frac{7}{3} e^{7t} & \frac{14}{3} e^{7t} - \frac{2}{3} e^t \\ \frac{7}{3} e^{7t} - \frac{1}{3} e^t & \frac{1}{3} e^t + \frac{14}{3} e^{7t} \end{bmatrix} \quad (14)$$

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

$$Identidad := \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad (15)$$

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

$$Inversa := \begin{bmatrix} \frac{2}{3} e^{-t} + \frac{1}{3} e^{-7t} & \frac{2}{3} e^{-7t} - \frac{2}{3} e^{-t} \\ \frac{1}{3} e^{-7t} - \frac{1}{3} e^{-t} & \frac{1}{3} e^{-t} + \frac{2}{3} e^{-7t} \end{bmatrix} \quad (16)$$

> Ident := simplify(evalm(MatExp &* Inversa))

$$Ident := \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad (17)$$

>
>
>