

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

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

```
> Condiciones := x(0) = 5, y(0) = -8
Condiciones := x(0) = 5, y(0) = -8\tag{2}
```

```
> SolucionGeneral := dsolve( {Sistema}, {x(t), y(t)} )
SolucionGeneral := {x(t) = _C1 e^t + _C2 e^{5t}, y(t) = -\frac{1}{3} _C1 e^t + _C2 e^{5t}}\tag{3}
```

```
> SolucionParticular := dsolve( {Sistema, Condiciones} ) : SolucionParticular1;
SolucionParticular2;
```

$$\begin{aligned}x(t) &= \frac{39}{4} e^t - \frac{19}{4} e^{5t} \\ y(t) &= -\frac{13}{4} e^t - \frac{19}{4} e^{5t}\end{aligned}\tag{4}$$

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

$$AA := \begin{bmatrix} 2 & 3 \\ 1 & 4 \end{bmatrix}\tag{5}$$

```
> with(linalg) :
```

```
> MatrizExponencial := exponential(AA, t)
```

$$MatrizExponencial := \begin{bmatrix} \frac{3}{4} e^t + \frac{1}{4} e^{5t} & \frac{3}{4} e^{5t} - \frac{3}{4} e^t \\ \frac{1}{4} e^{5t} - \frac{1}{4} e^t & \frac{1}{4} e^t + \frac{3}{4} e^{5t} \end{bmatrix}\tag{6}$$

```
> DerivadaMatrizExp := map(diff, MatrizExponencial, t)
```

$$DerivadaMatrizExp := \begin{bmatrix} \frac{3}{4} e^t + \frac{5}{4} e^{5t} & \frac{15}{4} e^{5t} - \frac{3}{4} e^t \\ \frac{5}{4} e^{5t} - \frac{1}{4} e^t & \frac{1}{4} e^t + \frac{15}{4} e^{5t} \end{bmatrix}\tag{7}$$

```
> ProAAMatExp := evalm( AA &* MatrizExponencial )
```

$$ProAAMatExp := \begin{bmatrix} \frac{3}{4} e^t + \frac{5}{4} e^{5t} & \frac{15}{4} e^{5t} - \frac{3}{4} e^t \\ \frac{5}{4} e^{5t} - \frac{1}{4} e^t & \frac{1}{4} e^t + \frac{15}{4} e^{5t} \end{bmatrix}\tag{8}$$

```
> Comprobar := evalm( DerivadaMatrizExp - ProAAMatExp ) = 0
```

$$Comprobar := \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix} = 0\tag{9}$$

