

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

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

```
> SolucionGeneral := dsolve({Sistema}) : SolucionGeneral1; SolucionGeneral2
```

$$\begin{aligned}x(t) &= \_C1 e^t + \_C2 e^{5t} \\ y(t) &= -\frac{1}{3} \_C1 e^t + \_C2 e^{5t}\end{aligned}\quad (2)$$

```
> Condiciones := x(0) = 2, y(0) = -2;
```

$$\text{Condiciones} := x(0) = 2, y(0) = -2 \quad (3)$$

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

$$\begin{aligned}x(t) &= 3 e^t - e^{5t} \\ y(t) &= -e^t - e^{5t}\end{aligned}\quad (4)$$

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

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

```
> with(linalg) :
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```
> MatrizExponencial := exponential(AA, t)
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$$\text{MatrizExponencial} := \begin{bmatrix} \frac{3}{4} e^t + \frac{1}{4} e^{5t} & \frac{3}{4} e^{5t} - \frac{3}{4} e^t \\ \frac{1}{4} e^{5t} - \frac{1}{4} e^t & \frac{1}{4} e^t + \frac{3}{4} e^{5t} \end{bmatrix} \quad (6)$$

```
> Xcero := array([2, -2]);
```

$$Xcero := \begin{bmatrix} 2 & -2 \end{bmatrix} \quad (7)$$

```
> Solucion := evalm( MatrizExponencial &* Xcero) : Sol1 := X(t) = Solucion1; Sol2 := Y(t)
= Solucion2;
```

$$\begin{aligned}\text{Sol}_1 &:= X(t) = 3 e^t - e^{5t} \\ \text{Sol}_2 &:= Y(t) = -e^t - e^{5t}\end{aligned}\quad (8)$$

```
> Xinicial := array([C1, C2])
```

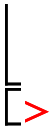
$$Xinicial := \begin{bmatrix} C1 & C2 \end{bmatrix} \quad (9)$$

```
> SolGral := evalm(MatrizExponencial &* Xinicial) : XX(t) = simplify(SolGral1);
```

$$XX(t) = \frac{3}{4} C1 e^t + \frac{1}{4} C1 e^{5t} + \frac{3}{4} C2 e^{5t} - \frac{3}{4} C2 e^t \quad (10)$$

```
> YY(t) = simplify(SolGral2)
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$$(11)$$



$$YY(t) = \frac{1}{4} C1 e^{5t} - \frac{1}{4} C1 e^t + \frac{1}{4} C2 e^t + \frac{3}{4} C2 e^{5t} \quad (11)$$