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

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

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

$$MatExp := \begin{bmatrix} \frac{3}{4}\,e^{t} + \frac{1}{4}\,e^{5t} & \frac{3}{4}\,e^{5t} - \frac{3}{4}\,e^{t} \\ \frac{1}{4}\,e^{5t} - \frac{1}{4}\,e^{t} & \frac{1}{4}\,e^{t} + \frac{3}{4}\,e^{5t} \end{bmatrix} \tag{2}$$

```
> Xcero := array([-1, 1])
```

$$Xcero := \begin{bmatrix} -1 & 1 \end{bmatrix} \tag{3}$$

```
> BB := array([t^2, 5 exp(t)])
```

$$BB := \begin{bmatrix} t^{2} & 5\,e^{t} \end{bmatrix} \tag{4}$$

```
> SolPart := evalm( MatExp &* Xcero) : SolPart[1]; SolPart[2];
```

$$-\frac{3}{2}\,e^{t} + \frac{1}{2}\,e^{5t}$$

$$\frac{1}{2}\,e^{5t} + \frac{1}{2}\,e^{t} \tag{5}$$

```
> MatExpTau := map(rcurry(eval, t='t - tau'), MatExp)
```

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

```
> BBtau := map(rcurry(eval, t='tau'), BB)
```

$$BBtau := \begin{bmatrix} \tau^{2} & 5\,e^{\tau} \end{bmatrix} \tag{7}$$

```
> ProdTau := evalm(MatExpTau &* BBtau) : ProdTau[1]; ProdTau[2];
```

$$\left(\frac{3}{4}\,e^{t-\tau} + \frac{1}{4}\,e^{5t-5\tau}\right)\tau^{2} + 5\left(\frac{3}{4}\,e^{5t-5\tau} - \frac{3}{4}\,e^{t-\tau}\right)e^{\tau}$$

$$\left(\frac{1}{4}\,e^{5t-5\tau} - \frac{1}{4}\,e^{t-\tau}\right)\tau^{2} + 5\left(\frac{1}{4}\,e^{t-\tau} + \frac{3}{4}\,e^{5t-5\tau}\right)e^{\tau} \tag{8}$$

```
> SolNoHom := map(int, ProdTau, tau = 0..t) : SolNoHom[1]; SolNoHom[2];
```

$$\frac{9}{16}\,e^{t} + \frac{1883}{2000}\,e^{5t} - \frac{4}{5}\,t^{2} - \frac{38}{25}\,t - \frac{188}{125} - \frac{15}{4}\,t\,e^{t}$$

$$\frac{1883}{2000}\,e^{5t} - \frac{23}{16}\,e^{t} + \frac{1}{5}\,t^{2} + \frac{12}{25}\,t + \frac{62}{125} + \frac{5}{4}\,t\,e^{t} \tag{9}$$

```
> SolCompleta := evalm(SolPart + SolNoHom) : x[1](t) = SolCompleta[1]; x[2](t)
    = SolCompleta[2]
```

$$x_{1}(t) = -\frac{15}{16}\,e^{t} + \frac{2883}{2000}\,e^{5t} - \frac{4}{5}\,t^{2} - \frac{38}{25}\,t - \frac{188}{125} - \frac{15}{4}\,t\,e^{t}$$

$$x_2(t) = \frac{2883}{2000}\, e^{5t} - \frac{15}{16}\, e^{t} + \frac{1}{5}\, t^2 + \frac{12}{25}\, t + \frac{62}{125} + \frac{5}{4}\, t\, e^{t} \quad (10)$$

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

$$Sistema_1 := \frac{d}{dt} x_1(t) = 2\, x_1(t) + 3\, x_2(t) + t^2 \quad (11)$$

> $Sistema[2] := diff(x[2](t), t) = x[1](t) + 4 \cdot x[2](t) + 5 \cdot \exp(t)$

$$Sistema_2 := \frac{d}{dt} x_2(t) = x_1(t) + 4\, x_2(t) + 5\, e^{t} \quad (12)$$

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

$$Comp_1 := 0 = 0 \quad (13)$$

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

$$Comp_2 := 0 = 0 \quad (14)$$

> *restart*

>