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

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

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

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

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

$$Identidad := \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \tag{3}$$

```
> DerMatExpAA := map(diff, MatExpAA, t)
```

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

```
> ProAAMateExp := evalm(AA &* MatExpAA)
```

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

```
> MatInversa := map(rcurry(eval, t = '-t'), MatExpAA)
```

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

```
> IdentidadDos := simplify(evalm(MatExpAA &* MatInversa))
```

$$IdentidadDos := \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \tag{7}$$

```
> restart
> AA := array([[0, 0, 1, 0], [0, 0, 0, 1], [-6, 7/2, 0, 0], [7, -7, 0, 0]])
```

$$AA := \begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ -6 & \frac{7}{2} & 0 & 0 \\ 7 & -7 & 0 & 0 \end{bmatrix} \quad (8)$$

```
> with(linalg):
> MatExp := simplify(exponential(AA, t)):
> MatExp[1, 1]: evalf(%, 2)
```

$$0.55\cos(1.2\,t) + 0.44\cos(3.4\,t) \quad (9)$$

```
> MatExp[4, 4]: evalf(%, 2)
```

$$0.46\cos(1.2\,t) + 0.55\cos(3.4\,t) \quad (10)$$

```
> Xcero := array([_C1, _C2, _C3, _C4])
```

$$Xcero := \begin{bmatrix} \_C1 & \_C2 & \_C3 & \_C4 \end{bmatrix} \quad (11)$$

```
> SolGral := evalm(MatExp &* Xcero):
> SolGral[1]: evalf(%, 2)
```

$$0.0022\,(250.\cos(1.2\,t) + 200.\cos(3.4\,t))\,\_C1 - 0.36\,(\cos(3.4\,t) - 1.\cos(1.2\,t))\,\_C2 + 0.00067\,(680.\sin(1.2\,t) + 200.\sin(3.4\,t))\,\_C3 + 0.040\,(6.8\sin(1.2\,t) - 2.4\sin(3.4\,t))\,\_C4 \quad (12)$$

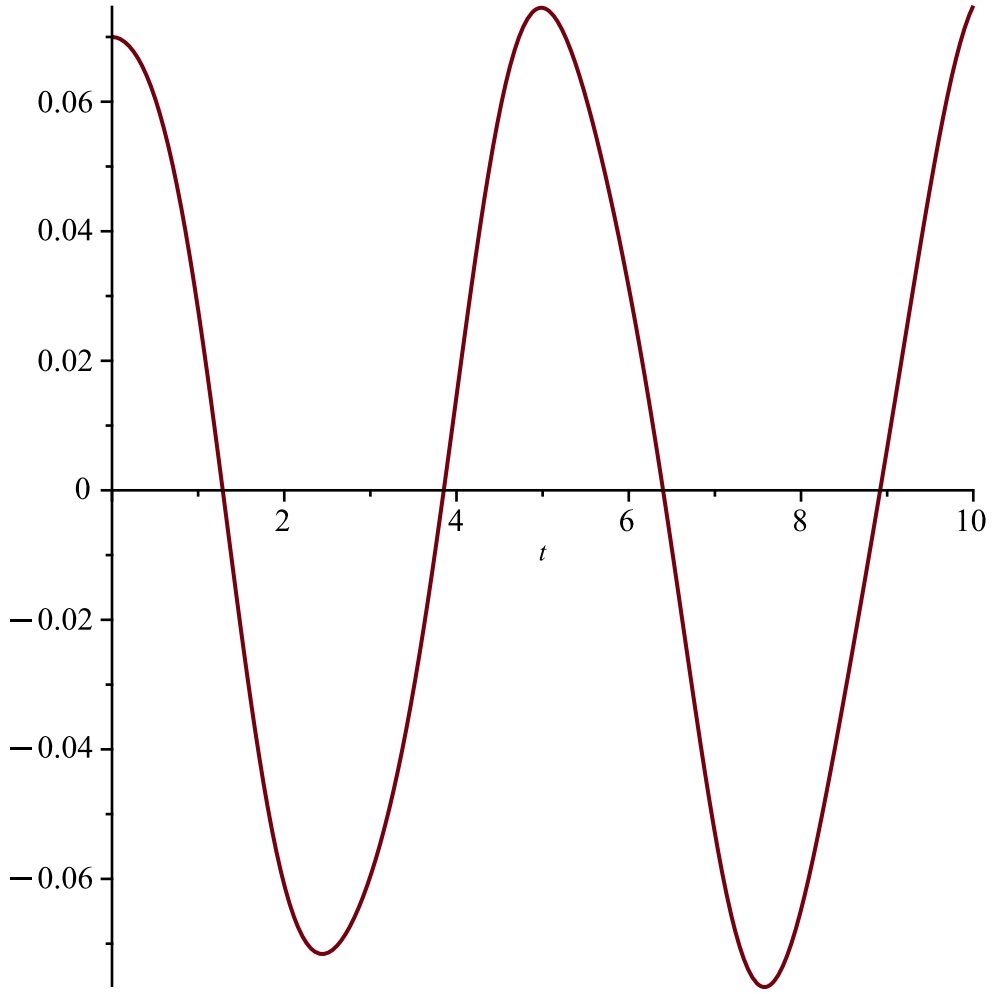
```
> XceroDos := array([7/100, 1/10, 0, 0])
```

$$XceroDos := \begin{bmatrix} \frac{7}{100} & \frac{1}{10} & 0 & 0 \end{bmatrix} \quad (13)$$

```
> SolPart := evalm(MatExp &* XceroDos):
> SolPart[1]: evalf(%, 2)
```

$$0.074\cos(1.2\,t) - 0.005\cos(3.4\,t) \quad (14)$$

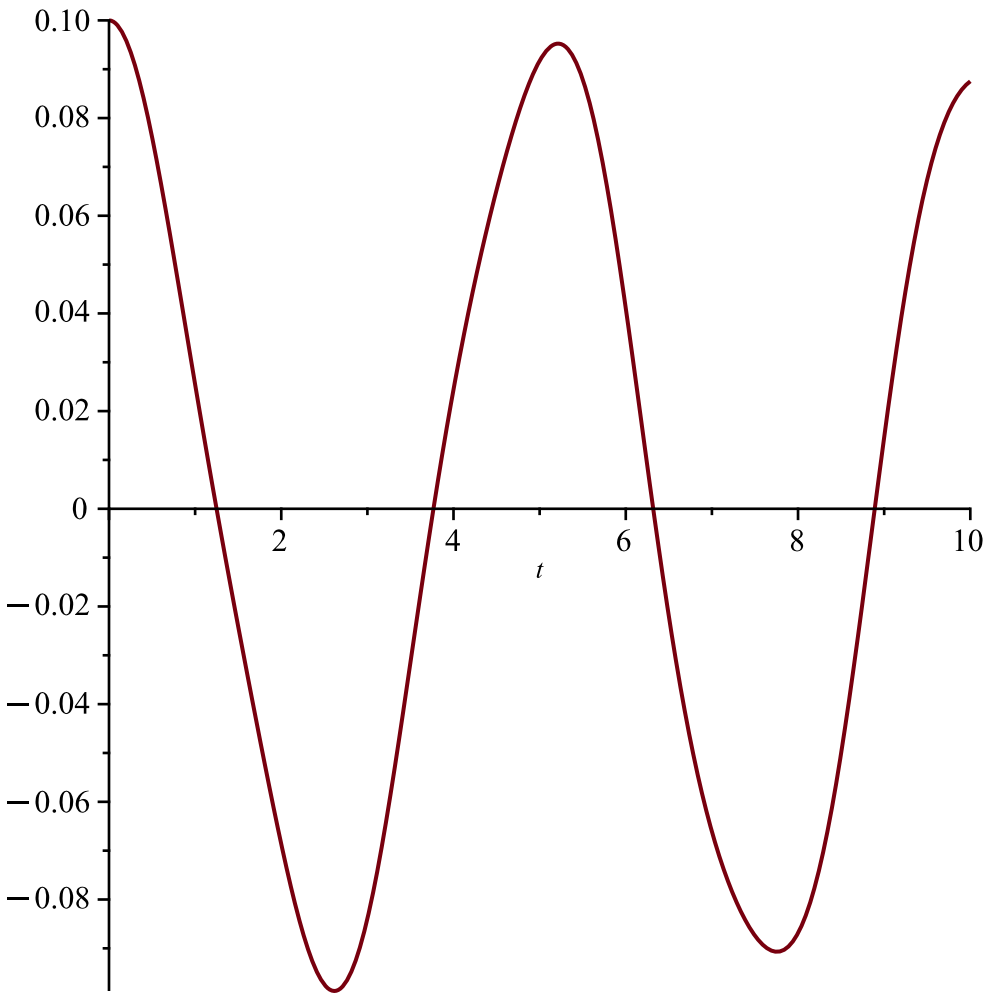
```
> plot(SolPart[1], t = 0..10)
```




```
> SolPart[2] : evalf(%, 2)
```

$$0.005\cos(3.4\,t) + 0.096\cos(1.2\,t) \qquad \textbf{(15)}$$

```
> plot(SolPart[2], t = 0..10)
```


0.10
0.08
0.06
0.04
0.02
0
−0.02
−0.04
−0.06
−0.08
2
4
6
8
10
t

>