

```
> restart
```

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

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

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

```
> MatExp := exponential(A, t)
```

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

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

$$II := \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad (3)$$

```
> MatExpDer := map(diff, MatExp, t)
```

$$MatExpDer := \begin{bmatrix} \frac{3}{4} e^t + \frac{5}{4} e^{5t} & \frac{15}{4} e^{5t} - \frac{3}{4} e^t \\ \frac{5}{4} e^{5t} - \frac{1}{4} e^t & \frac{1}{4} e^t + \frac{15}{4} e^{5t} \end{bmatrix} \quad (4)$$

```
> AA := map(rcurry(eval, t=0'), MatExpDer)
```

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

```
> restart
```

```
> Ecua := diff(F(x, y), x$2) + 5·diff(F(x, y), x, y) + 6·diff(F(x, y), y$2) = 0
```

$$Ecua := \frac{\partial^2}{\partial x^2} F(x, y) + 5 \left(\frac{\partial^2}{\partial y \partial x} F(x, y) \right) + 6 \left(\frac{\partial^2}{\partial y^2} F(x, y) \right) = 0 \quad (6)$$

```
> with(DEtools) :
```

```
> SolGral := pdsolve(Ecua)
```

$$SolGral := F(x, y) = _F1(y - 3x) + _F2(y - 2x) \quad (7)$$

```
> Comprobacion := simplify(eval(subs(F(x, y) = rhs(SolGral), Ecua)))
```

$$Comprobacion := 0 = 0 \quad (8)$$

```
> restart
```

```
> Ecua := diff(z(x, y), x$2) - 2·diff(z(x, y), x, y) + diff(z(x, y), y$2) = 0
```

$$Ecua := \frac{\partial^2}{\partial x^2} z(x, y) - 2 \left(\frac{\partial^2}{\partial y \partial x} z(x, y) \right) + \frac{\partial^2}{\partial y^2} z(x, y) = 0 \quad (9)$$

```
> SolGralUno := z(x, y) = \_F1(x + y) + x·\_F2(x + y)
```

$$SolGralUno := z(x, y) = _F1(x + y) + x _F2(x + y) \quad (10)$$

```
> SolGralDos := z(x, y) = \_F1(x + y) + y·\_F2(x + y)
```

$$SolGralDos := z(x, y) = _F1(x + y) + y _F2(x + y) \quad (11)$$

```
> ComprobacionUno := simplify(eval(subs(z(x, y) = rhs(SolGralUno), Ecua)))
```

$$ComprobacionUno := 0 = 0 \quad (12)$$

```
| > ComprobacionDos := simplify(eval(subs(z(x,y) = rhs(SolGralDos), Ecua) ))
|                                     ComprobacionDos := 0 = 0
```

(13)

```
| > with(DEtools) :
| > SolGralFinal := pdsolve(Ecua)
|                                     SolGralFinal := z(x,y) = _F1(x + y) + x _F2(x + y)
| >
```

(14)