```
> restart
> EDO := diff(y(x), x$2) - 2·diff(y(x), x) + y(x) = x·exp(x)
```

$$EDO := \frac{d^2}{dx^2} y(x) - 2\left(\frac{d}{dx} y(x)\right) + y(x) = x\, e^x \tag{1}$$

```
> EDOH := lhs(EDO) = 0
```

$$EDOH := \frac{d^2}{dx^2} y(x) - 2\left(\frac{d}{dx} y(x)\right) + y(x) = 0 \tag{2}$$

```
> NoHom := Q(x) = rhs(EDO)
```

$$NoHom := Q(x) = x\, e^x \tag{3}$$

```
> EC := m··2 - 2·m + 1 = 0
```

$$EC := m^2 - 2\,m + 1 = 0 \tag{4}$$

```
> Raiz := solve(EC)
```

$$Raiz := 1, 1 \tag{5}$$

```
> SGH := y(x) = C1·exp(Raiz[1]·x) + C2·x·exp(Raiz[1]·x)
```

$$SGH := y(x) = C1\, e^x + C2\, x\, e^x \tag{6}$$

```
> SGNH := y(x) = A(x)·exp(x) + B(x)·x·exp(x)
```

$$SGNH := y(x) = A(x)\, e^x + B(x)\, x\, e^x \tag{7}$$

```
> DSGNH := diff(SGNH, x)
```

$$DSGNH := \frac{d}{dx} y(x) = \left(\frac{d}{dx} A(x)\right) e^x + A(x)\, e^x + \left(\frac{d}{dx} B(x)\right) x\, e^x + B(x)\, e^x + B(x)\, x\, e^x \tag{8}$$

```
> EcuacionUno := (d/dx A(x)) e^x + (d/dx B(x)) x e^x = 0
```

$$EcuacionUno := \left(\frac{d}{dx} A(x)\right) e^x + \left(\frac{d}{dx} B(x)\right) x\, e^x = 0 \tag{9}$$

```
> DSGNHuno := d/dx y(x) = A(x) e^x + B(x) e^x + B(x) x e^x
```

$$DSGNHuno := \frac{d}{dx} y(x) = A(x)\, e^x + B(x)\, e^x + B(x)\, x\, e^x \tag{10}$$

```
> DDSGNH := diff(DSGNHuno, x)
```

$$DDSGNH := \frac{d^2}{dx^2} y(x) = \left(\frac{d}{dx} A(x)\right) e^x + A(x)\, e^x + \left(\frac{d}{dx} B(x)\right) e^x + 2\, B(x)\, e^x + \left(\frac{d}{dx} B(x)\right) x\, e^x + B(x)\, x\, e^x \tag{11}$$

```
> EcuacionDos := (d/dx A(x)) e^x + (d/dx B(x)) e^x + (d/dx B(x)) x e^x = rhs(NoHom)
```

$$EcuacionDos := \left(\frac{d}{dx} A(x)\right) e^x + \left(\frac{d}{dx} B(x)\right) e^x + \left(\frac{d}{dx} B(x)\right) x\, e^x = x\, e^x \tag{12}$$

```
> EcuacionUno; EcuacionDos;
```

$$\left(\frac{d}{dx} A(x)\right) e^x + \left(\frac{d}{dx} B(x)\right) x\, e^x = 0$$

$$\left(\frac{d}{dx} A(x)\right) e^x + \left(\frac{d}{dx} B(x)\right) e^x + \left(\frac{d}{dx} B(x)\right) x\, e^x = x\, e^x \tag{13}$$

```
> with(linalg) :
> Parametros := solve( {EcuacionUno, EcuacionDos}, {diff(A(x), x), diff(B(x), x)})
```

$$Parametros := \left\{ \frac{d}{dx} A(x) = -x^2, \frac{d}{dx} B(x) = x \right\} \quad (14)$$

```
> ParaUno := A(x) = int(rhs(Parametros[1]), x) + C1
```

$$ParaUno := A(x) = -\frac{1}{3} x^3 + C1 \quad (15)$$

```
> ParaDos := B(x) = int(rhs(Parametros[2]), x) + C2
```

$$ParaDos := B(x) = \frac{1}{2} x^2 + C2 \quad (16)$$

```
> SolucionGeneralNoHomogena := expand(simplify(subs(A(x) = rhs(ParaUno), B(x)
      = rhs(ParaDos), SGNH)))
```

$$SolucionGeneralNoHomogena := y(x) = \frac{1}{6} e^x x^3 + C1\, e^x + C2\, x\, e^x \quad (17)$$

```
> restart
> EDO := diff(y(x), x$2) - 2·diff(y(x), x) + y(x) = x·exp(x)
```

$$EDO := \frac{d^2}{dx^2} y(x) - 2\left(\frac{d}{dx} y(x)\right) + y(x) = x\, e^x \quad (18)$$

```
> SolHom := y(x) = C1·exp(x) + C2·x·exp(x)
```

$$SolHom := y(x) = C1\, e^x + C2\, x\, e^x \quad (19)$$

```
> OD := (D - 1)··2 = 0
```

$$OD := (D-1)^2 = 0 \quad (20)$$

```
> ADNH := (D - 1)··2·(D - 1)··2 = 0
```

$$ADNH := (D-1)^4 = 0 \quad (21)$$

```
> SGNH := y(x) = C1·exp(x) + C2·x·exp(x) + A·x··2·exp(x) + B·x··3·exp(x)
```

$$SGNH := y(x) = C1\, e^x + C2\, x\, e^x + A\, x^2 e^x + B\, x^3 e^x \quad (22)$$

```
> SPQ := y(x) = A x^2 e^x + B x^3 e^x
```

$$SPQ := y(x) = A\, x^2 e^x + B\, x^3 e^x \quad (23)$$

```
> Comp := eval(subs(y(x) = rhs(SPQ), EDO))
```

$$Comp := 2\, A\, e^x + 6\, B\, x\, e^x = x\, e^x \quad (24)$$

```
> Sistema := 2·A = 0, 6·B = 1;
```

$$Sistema := 2\, A = 0, 6\, B = 1 \quad (25)$$

```
> Para := solve( {Sistema}, {A, B})
```

$$Para := \left\{ A = 0, B = \frac{1}{6} \right\} \quad (26)$$

```
> SolucionGneralNoHomogena := subs(A = rhs(Para[1]), B = rhs(Para[2]), SGNH)
```

$$SolucionGneralNoHomogena := y(x) = C1\, e^x + C2\, x\, e^x + \frac{1}{6} x^3 e^x \quad (27)$$

```
> restart
> Raiz := solve(m··3 + 27 = 0)
```

$$Raiz := -3, \frac{3}{2} + \frac{3}{2} I\sqrt{3}, \frac{3}{2} - \frac{3}{2} I\sqrt{3} \quad (28)$$

```
> ecuacion := expand( (m - Raiz[2])·(m - Raiz[3]) ) = 0
```

$$ecuacion := m^2 - 3\,m + 9 = 0 \quad \textbf{(29)}$$

```
> ecuacionCompleta := expand((m + 3)·lhs(ecuacion) = 0)
```

$$ecuacionCompleta := m^3 + 27 = 0 \quad \textbf{(30)}$$

```
>
```