```
> restart
> EcuaCarac := m^3 - m^2 + m - 1 = 0
```

$$EcuaCarac := m^3 - m^2 + m - 1 = 0 \quad (1)$$

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

$$Raiz := 1, I, -I \quad (2)$$

```
> simplify( (m - I)·(m + I) ) = 0
```

$$m^2 + 1 = 0 \quad (3)$$

```
> EcuaDos := (m - 1)·(m^2 + 1) = 0
```

$$EcuaDos := (m - 1)\,(m^2 + 1) = 0 \quad (4)$$

```
> Ecua := y'''-y''+y'-y = x^2 + x
```

$$Ecua := \frac{d^3}{dx^3} y(x) - \frac{d^2}{dx^2} y(x) + \frac{d}{dx} y(x) - y(x) = x^2 + x \quad (5)$$

```
> SolGral := y(x) = _C1·exp(x) + _C2·cos(x) + _C3·sin(x) - 1 - 3·x - x^2
```

$$SolGral := y(x) = c_1 e^x + c_2 \cos(x) + c_3 \sin(x) - 1 - 3x - x^2 \quad (6)$$

```
> SolGralHom := y(x) = _C1 e^x + _C2 cos(x) + _C3 sin(x)
```

$$SolGralHom := y(x) = c_1 e^x + c_2 \cos(x) + c_3 \sin(x) \quad (7)$$

```
> EcuaHom := d^3/dx^3 y(x) - d^2/dx^2 y(x) + d/dx y(x) - y(x) = 0
```

$$EcuaHom := \frac{d^3}{dx^3} y(x) - \frac{d^2}{dx^2} y(x) + \frac{d}{dx} y(x) - y(x) = 0 \quad (8)$$

```
> SolGralHomDos := dsolve(EcuaHom)
```

$$SolGralHomDos := y(x) = c_1 e^x + c_2 \sin(x) + c_3 \cos(x) \quad (9)$$

```
> SolGralDos := dsolve(Ecua)
```

$$SolGralDos := y(x) = -x^2 - 3x - 1 + c_1 \cos(x) + c_2 e^x + c_3 \sin(x) \quad (10)$$

```
> restart
> EcuaCarac := expand( (m - 2)·(m - 3)^2 ) = 0
```

$$EcuaCarac := m^3 - 8m^2 + 21m - 18 = 0 \quad (11)$$

```
> Ecua := y'''-8·y''+21·y'-18·y = 5·exp(3·x) + 7·x^2
```

$$Ecua := \frac{d^3}{dx^3} y(x) - 8 \frac{d^2}{dx^2} y(x) + 21 \frac{d}{dx} y(x) - 18\, y(x) = 5 e^{3x} + 7x^2 \quad (12)$$

```
> SolGralHom := y(x) = _C1·exp(2·x) + _C2·exp(3·x) + _C3·x·exp(3·x)
```

$$SolGralHom := y(x) = c_1 e^{2x} + c_2 e^{3x} + c_3 x e^{3x} \quad (13)$$

```
> SolPartQ := y(x) = A·x^2·exp(3·x) + B + D·x + E·x^2
```

$$SolPartQ := y(x) = A x^2 e^{3x} + B + Dx + Ex^2 \quad (14)$$

```
> PasoDos := expand(eval(subs(y(x) = rhs(SolPartQ), Ecua)))
```

$$PasoDos := 2A \left(e^x\right)^3 - 16E + 21D + 42Ex - 18B - 18Dx - 18Ex^2 = 5 \left(e^x\right)^3 + 7x^2 \quad (15)$$

> $EcuaUno := 2\,A = 5$

$$EcuaUno := 2\,A = 5 \tag{16}$$

> $EcuaDos := -16\,E + 21\,\mathrm{D} - 18\,B = 0$

$$EcuaDos := -16\,E + 21\,\mathrm{D} - 18\,B = 0 \tag{17}$$

> $EcuaTres := +42\,E - 18\,\mathrm{D} = 0$

$$EcuaTres := 42\,E - 18\,\mathrm{D} = 0 \tag{18}$$

> $EcuaCuatro := -18\,E = 7$

$$EcuaCuatro := -18\,E = 7 \tag{19}$$

> $Sistema := EcuaUno, EcuaDos, EcuaTres, EcuaCuatro : Sistema[1]; Sistema[2]; Sistema[3]; Sistema[4]$

$$2\,A = 5$$
$$-16\,E + 21\,\mathrm{D} - 18\,B = 0$$
$$42\,E - 18\,\mathrm{D} = 0$$
$$-18\,E = 7 \tag{20}$$

> $with(linalg) :$

> $Para := solve(\{Sistema\})$

$$Para := \left\{A = \frac{5}{2}, B = -\frac{77}{108}, \mathrm{D} = -\frac{49}{54}, E = -\frac{7}{18}\right\} \tag{21}$$

> $Ecua$

$$\frac{d^3}{dx^3}\,y(x) - 8\,\frac{d^2}{dx^2}\,y(x) + 21\,\frac{d}{dx}\,y(x) - 18\,y(x) = 5\,e^{3\,x} + 7\,x^2 \tag{22}$$

> $SolPartQ$

$$y(x) = A\,x^2\,e^{3\,x} + B + \mathrm{D}\,x + E\,x^2 \tag{23}$$

> $SolPart := subs(A = rhs(Para[1]), B = rhs(Para[2]), \mathrm{D} = rhs(Para[3]), E = rhs(Para[4]), SolPartQ)$

$$SolPart := y(x) = \frac{5\,x^2\,e^{3\,x}}{2} - \frac{77}{108} - \frac{49\,x}{54} - \frac{7\,x^2}{18} \tag{24}$$

> $SolGralHom$

$$y(x) = \_C1\,e^{2\,x} + \_C2\,e^{3\,x} + \_C3\,x\,e^{3\,x} \tag{25}$$

> $SolGralNoHom := y(x) = rhs(SolGralHom) + rhs(SolPart)$

$$SolGralNoHom := y(x) = \_C1\,e^{2\,x} + \_C2\,e^{3\,x} + \_C3\,x\,e^{3\,x} + \frac{5\,x^2\,e^{3\,x}}{2} - \frac{77}{108} - \frac{49\,x}{54} - \frac{7\,x^2}{18} \tag{26}$$

> $Ecua$

$$\frac{d^3}{dx^3}\,y(x) - 8\,\frac{d^2}{dx^2}\,y(x) + 21\,\frac{d}{dx}\,y(x) - 18\,y(x) = 5\,e^{3\,x} + 7\,x^2 \tag{27}$$

> $Comprobar := simplify(eval(subs(y(x) = rhs(SolGralNoHom), lhs(Ecua) - rhs(Ecua) = 0)))$

$$Comprobar := 0 = 0 \tag{28}$$

>