> restart

> $Ecua := y'' - 7\cdot y' + 12\cdot y = 6\cdot \exp(2\cdot x)$

$$Ecua := \frac{d^2}{dx^2} y(x) - 7 \frac{d}{dx} y(x) + 12\, y(x) = 6\, e^{2x} \quad (1)$$

> $EcuaHom := lhs(Ecua) = 0$

$$EcuaHom := \frac{d^2}{dx^2} y(x) - 7 \frac{d}{dx} y(x) + 12\, y(x) = 0 \quad (2)$$

> $Q := rhs(Ecua)$

$$Q := 6\, e^{2x} \quad (3)$$

Por el método de Coeficientes Indeterminados

> $EcuaCarac := (m-3)\cdot(m-4)\cdot(m-2) = 0$

$$EcuaCarac := (m-3)\,(m-4)\,(m-2) = 0 \quad (4)$$

> $yy[1] := \exp(3\cdot x); yy[2] := \exp(4\cdot x)$

$$yy_1 := e^{3x}$$

$$yy_2 := e^{4x} \quad (5)$$

> $SolHom := y(x) = \_C1\cdot yy[1] + \_C2\cdot yy[2]$

$$SolHom := y(x) = \_C1\, e^{3x} + \_C2\, e^{4x} \quad (6)$$

> $SolNoHom := y(x) = A\cdot \exp(2\,x)$

$$SolNoHom := y(x) = A\, e^{2x} \quad (7)$$

> $ParaInd := isolate(Q = simplify(eval(subs(y(x) = rhs(SolNoHom), lhs(Ecua)))), A)$

$$ParaInd := A = 3 \quad (8)$$

>

> $SolGral := y(x) = subs(A = rhs(ParaInd), \_C1\cdot\exp(3\cdot x) + \_C2\cdot\exp(4\cdot x) + A\cdot\exp(2\cdot x))$

$$SolGral := y(x) = \_C1\, e^{3x} + \_C2\, e^{4x} + 3\, e^{2x} \quad (9)$$

Por el método de Parámentros Variables

> $Ecua$

$$\frac{d^2}{dx^2} y(x) - 7 \frac{d}{dx} y(x) + 12\, y(x) = 6\, e^{2x} \quad (10)$$

> $EcuaHom := lhs(Ecua) = 0$

$$EcuaHom := \frac{d^2}{dx^2} y(x) - 7 \frac{d}{dx} y(x) + 12\, y(x) = 0 \quad (11)$$

> $SolGralHom := y(x) = \_C1\cdot\exp(3\cdot x) + \_C2\cdot\exp(4\cdot x)$

$$SolGralHom := y(x) = \_C1\, e^{3x} + \_C2\, e^{4x} \quad (12)$$

> $SolGralNoHom := y(x) = AA\cdot\exp(3\,x) + BB\cdot\exp(4\cdot x)$

$$SolGralNoHom := y(x) = AA\, e^{3x} + BB\, e^{4x} \quad (13)$$

> $with(linalg):$

> $WW := wronskian([\exp(3\cdot x), \exp(4\cdot x)], x)$

(14)

$$WW := \begin{bmatrix} e^{3x} & e^{4x} \\ 3e^{3x} & 4e^{4x} \end{bmatrix} \quad (14)$$

> $QQ := array([0, Q])$

$$QQ := \begin{bmatrix} 0 & 6e^{2x} \end{bmatrix} \quad (15)$$

> $ParaVar := simplify(linsolve(WW, QQ))$

$$ParaVar := \begin{bmatrix} -6e^{-x} & 6e^{-2x} \end{bmatrix} \quad (16)$$

> $Aprima := ParaVar[1]; Bprima := ParaVar[2]$

$$Aprima := -6e^{-x}$$

$$Bprima := 6e^{-2x} \quad (17)$$

> $SolGralNoHom := y(x) = simplify((int(Aprima, x) + \_C1)\cdot yy[1] + (int(Bprima, x) + \_C2)\cdot yy[2])$

$$SolGralNoHom := y(x) = \_C1\, e^{3x} + \_C2\, e^{4x} + 3e^{2x} \quad (18)$$

> $SolGral$

$$y(x) = \_C1\, e^{3x} + \_C2\, e^{4x} + 3e^{2x} \quad (19)$$

> $restart$

> $Ecua := y'' + 2\cdot y' + 2\cdot y = 3\cdot\exp(x)\cdot\cos(x)$

$$Ecua := \frac{d^2}{dx^2} y(x) + 2\frac{d}{dx} y(x) + 2y(x) = 3e^{x}\cos(x) \quad (20)$$

> $EcuaHom := lhs(Ecua) = 0$

$$EcuaHom := \frac{d^2}{dx^2} y(x) + 2\frac{d}{dx} y(x) + 2y(x) = 0 \quad (21)$$

> $Q := rhs(Ecua)$

$$Q := 3e^{x}\cos(x) \quad (22)$$

> $EcuaCarac := m^2 + 2\cdot m + 2 = 0$

$$EcuaCarac := m^2 + 2m + 2 = 0 \quad (23)$$

> $Para := solve(EcuaCarac)$

$$Para := -1 + I, -1 - I \quad (24)$$

> $yy[1] := \exp(\mathrm{Re}(Para[1])\cdot x)\cdot\cos(\mathrm{Im}(Para[1])\cdot x); yy[2] := \exp(\mathrm{Re}(Para[1])\cdot x)\cdot\sin(\mathrm{Im}(Para[1])\cdot x)$

$$yy_1 := e^{-x}\cos(x)$$

$$yy_2 := e^{-x}\sin(x) \quad (25)$$

> $with(linalg):$

> $WW := wronskian([yy[1], yy[2]], x)$

$$WW := \begin{bmatrix} e^{-x}\cos(x) & e^{-x}\sin(x) \\ -e^{-x}\cos(x) - e^{-x}\sin(x) & -e^{-x}\sin(x) + e^{-x}\cos(x) \end{bmatrix} \quad (26)$$

> $BB := array([0, Q])$

$$BB := \begin{bmatrix} 0 & 3\,e^{x}\cos(x) \end{bmatrix} \tag{27}$$

> $ParaVar := simplify(linsolve(WW, BB))$

$$ParaVar := \begin{bmatrix} -3\,e^{2x}\sin(x)\cos(x) & 3\,e^{2x}\cos(x)^{2} \end{bmatrix} \tag{28}$$

> $Aprima := ParaVar[1]$

$$Aprima := -3\,e^{2x}\sin(x)\cos(x) \tag{29}$$

> $Bprima := ParaVar[2]$

$$Bprima := 3\,e^{2x}\cos(x)^{2} \tag{30}$$

> $AA := int(Aprima, x)$

$$AA := -\frac{3\,e^{2x}\,(2\sin(2x) - 2\cos(2x))}{16} \tag{31}$$

> $BB := int(Bprima, x)$

$$BB := \frac{3\,(2\cos(x) + 2\sin(x))\,e^{2x}\cos(x)}{8} + \frac{3\,(e^{x})^{2}}{8} \tag{32}$$

> $SolGralNoHom := y(x) = expand(simplify((int(Aprima, x) + \_C1)\cdot yy[1] + (int(Bprima, x) + C2)\cdot yy[2]))$

$$SolGralNoHom := y(x) = \frac{\sin(x)\,C2}{e^{x}} + \frac{\cos(x)\,\_C1}{e^{x}} + \frac{3\,e^{x}\cos(x)}{8} + \frac{3\sin(x)\,e^{x}}{8} \tag{33}$$

> $Ecua$

$$\frac{d^{2}}{dx^{2}}y(x) + 2\frac{d}{dx}y(x) + 2\,y(x) = 3\,e^{x}\cos(x) \tag{34}$$

> $restart$

> $Ecua := y'' - 4\cdot y' + 4\cdot y = 2\cdot x^{2}\cdot\exp(2x)$

$$Ecua := \frac{d^{2}}{dx^{2}}y(x) - 4\frac{d}{dx}y(x) + 4\,y(x) = 2\,x^{2}\,e^{2x} \tag{35}$$

> $EcuaHom := lhs(Ecua) = 0$

$$EcuaHom := \frac{d^{2}}{dx^{2}}y(x) - 4\frac{d}{dx}y(x) + 4\,y(x) = 0 \tag{36}$$

> $Q := rhs(Ecua)$

$$Q := 2\,x^{2}\,e^{2x} \tag{37}$$

> $EcuaCarac := m^{2} - 4\cdot m + 4 = 0$

$$EcuaCarac := m^{2} - 4\,m + 4 = 0 \tag{38}$$

> $Raiz := solve(EcuaCarac)$

$$Raiz := 2, 2 \tag{39}$$

> $yy[1] := \exp(Raiz[1]\cdot x); yy[2] := x\cdot\exp(Raiz[1]\cdot x)$

$$yy_{1} := e^{2x}$$

$$yy_{2} := x\,e^{2x} \tag{40}$$

> $with(linalg):$

```
> WW := wronskian([yy[1], yy[2]], x)
```

$$WW := \begin{bmatrix} e^{2x} & x e^{2x} \\ 2 e^{2x} & e^{2x} + 2 x e^{2x} \end{bmatrix} \quad (41)$$

```
> BB := array([0, Q])
```

$$BB := \begin{bmatrix} 0 & 2 x^2 e^{2x} \end{bmatrix} \quad (42)$$

```
> ParaVar := linsolve(WW, BB)
```

$$ParaVar := \begin{bmatrix} -2 x^3 & 2 x^2 \end{bmatrix} \quad (43)$$

```
> Aprima := ParaVar[1]; Bprima := ParaVar[2]
```

$$Aprima := -2 x^3$$

$$Bprima := 2 x^2 \quad (44)$$

```
> AA := int(Aprima, x);
```

$$AA := -\frac{x^4}{2} \quad (45)$$

```
> BB := int(Bprima, x)
```

$$BB := \frac{2 x^3}{3} \quad (46)$$

```
> SolGral := y(x) = simplify((AA + _C1)·yy[1] + (BB + _C2)·yy[2])
```

$$SolGral := y(x) = e^{2x}\left(\frac{1}{6} x^4 + \_C1 + x \_C2\right) \quad (47)$$

```
> Ecua
```

$$\frac{d^2}{dx^2} y(x) - 4 \frac{d}{dx} y(x) + 4 y(x) = 2 x^2 e^{2x} \quad (48)$$

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

$$Comprobar := 0 = 0 \quad (49)$$

```
> restart
>
```