> restart

> $y[1] := \exp(2x); y[2] := \exp(-3x)$

$$y_1 := e^{2x}$$

$$y_2 := e^{-3x} \qquad \textbf{(1)}$$

> with(linalg) :

> $det(wronskian([y[1], y[2]], x)) \neq 0$

$$-5\, e^{2x} e^{-3x} \neq 0 \qquad \textbf{(2)}$$

> $y[3] := 5 \exp(2x)$

$$y_3 := 5\, e^{2x} \qquad \textbf{(3)}$$

> $det(wronskian([y[1], y[3]], x)) = 0$

$$0 = 0 \qquad \textbf{(4)}$$

> $y[4] := \exp(5x)\cos(2x)$

$$y_4 := e^{5x} \cos(2x) \qquad \textbf{(5)}$$

> $y[5] := \exp(5x)\sin(2x)$

$$y_5 := e^{5x} \sin(2x) \qquad \textbf{(6)}$$

> $simplify(det(wronskian([y[4], y[5]], x))) \neq 0$

$$2\, e^{10x} \neq 0 \qquad \textbf{(7)}$$

> restart

> $SolGral := y(x) = C[1] \cdot \exp(5x)\cos(2x) + C[2] \cdot \exp(5x)\sin(2x)$

$$SolGral := y(x) = C_1\, e^{5x} \cos(2x) + C_2\, e^{5x} \sin(2x) \qquad \textbf{(8)}$$

> $Ecua := diff(y(x), x\$2) - 10\, diff(y(x), x) + 29\, y(x) = 0$

$$Ecua := \frac{d^2}{dx^2} y(x) - 10 \left(\frac{d}{dx} y(x) \right) + 29\, y(x) = 0 \qquad \textbf{(9)}$$

> $SolGralDos := dsolve(Ecua)$

$$SolGralDos := y(x) = \_C1\, e^{5x} \sin(2x) + \_C2\, e^{5x} \cos(2x) \qquad \textbf{(10)}$$

> $m[1] := 5 + 2\,I; m[2] := 5 - 2\,I$

$$m_1 := 5 + 2\,I$$

$$m_2 := 5 - 2\,I \qquad \textbf{(11)}$$

> $EcuaCarac := expand((m - m[1]) \cdot (m - m[2])) = 0$

$$EcuaCarac := m^2 - 10\, m + 29 = 0 \qquad \textbf{(12)}$$

> restart

> $Ecua := diff(y(x), x\$2) - 6\, diff(y(x), x) + 9\, y(x) = 0$

$$Ecua := \frac{d^2}{dx^2} y(x) - 6 \left(\frac{d}{dx} y(x) \right) + 9\, y(x) = 0 \qquad \textbf{(13)}$$

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

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

$$yy_2 := x\, e^{3x} \qquad \textbf{(14)}$$

> with(linalg) :

> $det(wronskian([yy[1], yy[2]], x)) \neq 0$

$$\left(e^{3x}\right)^2 \neq 0 \tag{15}$$

> $comprobacion := simplify(eval(subs(y(x) = yy[2], Ecua)))$

$$comprobacion := 0 = 0 \tag{16}$$

> $SolGral := y(x) = C[1] \cdot yy[1] + C[2] \cdot yy[2]$

$$SolGral := y(x) = C_1\, e^{3x} + C_2\, x\, e^{3x} \tag{17}$$

> $SolGralDos := dsolve(Ecua)$

$$SolGralDos := y(x) = \_C1\, e^{3x} + \_C2\, e^{3x}\, x \tag{18}$$

> $restart$

> $Ecua := diff(y(t), t\$2) + diff(y(t), t) + y(t) = 0$

$$Ecua := \frac{d^2}{dt^2}\, y(t) + \frac{d}{dt}\, y(t) + y(t) = 0 \tag{19}$$

> $SolGral := dsolve(Ecua)$

$$SolGral := y(t) = \_C1\, e^{-\frac{1}{2}t} \sin\left(\frac{1}{2}\sqrt{3}\, t\right) + \_C2\, e^{-\frac{1}{2}t} \cos\left(\frac{1}{2}\sqrt{3}\, t\right) \tag{20}$$

> $EcuaCarac := expand\left(\left(m - \left(-\frac{1}{2} + \frac{sqrt(3)}{2}I\right)\right) \cdot \left(m - \left(-\frac{1}{2} - \frac{sqrt(3)}{2}I\right)\right)\right) = 0$

$$EcuaCarac := m^2 + m + 1 = 0 \tag{21}$$

> $restart$

> $Ecua := diff(y(t), t\$2) - 5 \cdot diff(y(t), t) - 36\, y(t) = 0$

$$Ecua := \frac{d^2}{dt^2}\, y(t) - 5\left(\frac{d}{dt}\, y(t)\right) - 36\, y(t) = 0 \tag{22}$$

> $Solgral := dsolve(Ecua)$

$$Solgral := y(t) = \_C1\, e^{9t} + \_C2\, e^{-4t} \tag{23}$$

> $EcuaCarac := expand((m - 9) \cdot (m + 4)) = 0$

$$EcuaCarac := m^2 - 5\, m - 36 = 0 \tag{24}$$

> $restart$

> $Ecua := diff(y(x), x\$3) = 0$

$$Ecua := \frac{d^3}{dx^3}\, y(x) = 0 \tag{25}$$

> $SolGral := dsolve(Ecua)$

$$SolGral := y(x) = \frac{1}{2}\, \_C1\, x^2 + \_C2\, x + \_C3 \tag{26}$$

> $restart$

> $Ecua := diff(y(x), x\$3) + diff(y(x), x\$2) + diff(y(x), x) + y(x) = 0$

$$Ecua := \frac{d^3}{dx^3}\, y(x) + \frac{d^2}{dx^2}\, y(x) + \frac{d}{dx}\, y(x) + y(x) = 0 \tag{27}$$

> $SolGral := dsolve(Ecua)$

$$SolGral := y(x) = \_C1\, e^{-x} + \_C2\, \sin(x) + \_C3\, \cos(x) \tag{28}$$

> $EcuaCarac := expand((m + 1) \cdot (m + I) \cdot (m - I)) = 0$

$$\tag{29}$$

$$EcuaCarac := m^3 + m^2 + m + 1 = 0 \tag{29}$$

> *restart*

> $Ecua := diff(y(x), x\$3) + 2\ diff(y(x), x\$2) + 22\ diff(y(x), x) - 74\ y(x) = 0$

$$Ecua := \frac{d^3}{dx^3} y(x) + 2 \left(\frac{d^2}{dx^2} y(x) \right) + 22 \left(\frac{d}{dx} y(x) \right) - 74\ y(x) = 0 \tag{30}$$

> $SolGral := dsolve(Ecua) : evalf(\%, 3)$

$$y(x) = \_C1\ e^{2.31x} - 1.\ \_C2\ e^{-2.15x} \sin(5.23\ x) + \_C3\ e^{-2.15x} \cos(5.23\ x) \tag{31}$$

>