EDO(2)LccH.

$$\frac{d^2y}{dx^2} + a_1\frac{dy}{dx} + a_2 y = 0$$

$$y = e^{mx} \rightarrow m^2 + a_1 m + a_2 = 0 \quad \begin{cases} m_1 \\ m_2 \end{cases}$$

ecuación característica

$$y_1 = e^{m_1 x}$$

$$y_2 = e^{m_2 x} \quad m_1 \neq m_2 \quad y_g = C_1 e^{m_1 x} + C_2 e^{m_2 x}$$

$$y_g = C_1 e^{x} + C_2 e^{-x}$$ EDO(2) L cc H

$m_1 = 1 \qquad m_2 = -1$

$(m-1)(m+1) = 0$

$m^2 - 1 = 0$

$$\frac{d^2y}{dx^2} - y = 0$$

$$y_g = C_1 e^{x} + C_2 e^{2x} + C_3 e^{-3x} + C_4 e^{4x} + C_5 e^{-5x}$$

EDO(5) L cc H

$\frac{dy}{dx} = y \rightarrow y = e^{x}$

$$(m-1)(m-2)(m+3)(m-4)(m+5) = 0$$

$$(m^2 - 3m + 2)(m^2 - m - 12)(m+5) = 0$$

$$(m^4 - 4m^3 + 13m^2 + 34m - 24)(m+5) = 0$$

$$m^5 + m^4 - 27m^3 - m^2 + 146m - 120 = 0$$

$EcuaCaract := m^5 + m^4 - 27\,m^3 - m^2 + 146\,m - 120 = 0$

$$\frac{d^5y}{dx^5} + \frac{dy^4}{dx^4} - 27\frac{d^3y}{dx^3} - \frac{d^2y}{dx^2} + 146\frac{dy}{dx} - 120y = 0$$

$$\frac{d^2y}{dx^2} + a_1\frac{dy}{dx} + a_2 y = 0 \quad \text{EDO(2) L cc H.}$$

$$m^2 + a_1 m + a_2 = 0 \longrightarrow \begin{cases} m_1 \\ m_2 \end{cases} \quad m_1 = m_2$$

$$y_g = C_1 e^{m_1 x} + C_2 e^{m_1 x} \Rightarrow (C_1 + C_2) e^{m_1 x}$$

$$y_g = C_1 e^{m_1 x} + C_2 y_2$$

$$\frac{d}{dm}\begin{cases} m^2 + a_1 m + a_2 = 0 \quad m_1 = m_2 \Rightarrow (m - m_1)^2 = 0 \\ 2m + a_1 = 0 \quad m_1 \end{cases}$$

$$\frac{d}{dm}\left(2(m - m_1) = 0\right)$$

$$m^2 + a_1 m + a_2 = 0 \quad m_1 \neq m_2 \quad (m - m_1)(m - m_2) = 0$$

$$\frac{d}{dm} \rightarrow (m - m_1) + (m - m_2) = 0$$

$$m^2 + a_1 m + a_2 = 0 \qquad m_1 = m_2$$

$$e^{mx} \xrightarrow{m=m_1} e^{m_1 x}$$

$$\frac{\partial}{\partial m}: \quad x e^{mx} \xrightarrow{m=m_1} x e^{m_1 x}$$

$$y_g = C_1 e^{m_1 x} + C_2 x e^{m_1 x} \qquad W = \begin{vmatrix} e^{m_1 x} & x e^{m_1 x} \\ m_1 e^{m_1 x} & m_1 x e^{m_1 x} + e^{m_1 x} \end{vmatrix} \neq 0$$

$$\frac{d^2y}{dx^2} + a_1 \frac{dy}{dx} + a_2 y = 0$$

$$y = x e^{m_1 x}$$

$$\frac{dy}{dx} = m_1 x e^{m_1 x} + e^{m_1 x}$$

$$\frac{d^2y}{dx^2} = m_1^2 x e^{m_1 x} + 2 m_1 e^{m_1 x}$$

$$\left[m_1^2 x e^{m_1 x} + 2 m_1 e^{m_1 x} \right] + a_1 \left[m_1 x e^{m_1 x} + e^{m_1 x} \right] + a_2 \left[x e^{m_1 x} \right] = 0$$

$$\left(m_1^2 + a_1 m_1 + a_2 \right) x e^{m_1 x} + \left(2 m_1 + a_1 \right) e^{m_1 x} = 0$$

$$(0) x e^{m_1 x} + (0) e^{m_1 x} = 0$$

$$0 \equiv 0$$

EDO(2) L cc H.

$$\frac{d^2y}{dx^2}=0 \qquad \frac{dy}{dx}=C_1 \qquad dy=C_1\,dx$$

$$\int dy = C_1\int dx \Rightarrow y+k_1 = C_1x+k_2$$

$$y=C_1x+(k_2-k_1) \Rightarrow y=C_1x+C_2$$

$$m^2=0 \qquad m_1=0 \qquad m_2=0$$

$$y=C_1e^{m_1x}+C_2xe^{m_1x}$$

$$y=C_1+C_2x$$

$$\frac{d^2y}{dx^2} + 2\frac{dy}{dx} + y = 0$$

$$m^2 + 2m + 1 = 0$$

$$(m+1)^2 = 0 \qquad m_1 = -1 \qquad m_2 = -1$$

$$y_g = c_1 e^{-x} + c_2 x e^{+x}$$

$$\frac{d^3y}{dx^3} - 3\frac{d^2y}{dx^2} + 3\frac{dy}{dx} - y = 0$$

1
1 2 1
1 3 3 1

$$m^3 - 3m^2 + 3m - 1 = 0$$

$$(m-1)^3 = 0 \qquad m_1 = 1 \qquad m_2 = 1 \qquad m_3 = 1$$

$$y_g = c_1 e^{x} + c_2 x e^{x} + c_3 x^2 e^{x}$$

$$\frac{dy}{dx} + p(x)\, y = q(x)$$

$$y = C_1 e^{-\int p(x)dx} + e^{-\int p(x)dx} \int e^{\int p(x)dx} q(x)\, dx$$

$$\int u\, dv = uv - \int v\, du.$$