LINEAL NO HOMOGÉNEA

$$y_g = C_1 e^{x} + C_2 e^{2x} + 8e^{4x}$$

EDO (2) LCC NH

$$\frac{d^2y}{dx^2} + a_1\frac{dy}{dx} + a_2 y = Q(x) \qquad Q(x) \neq 0$$

$$\frac{dy}{dx} = C_1 e^{x} + 2C_2 e^{2x} + 32e^{4x}$$

$$\frac{d^2y}{dx^2} = C_1 e^{x} + 4C_2 e^{2x} + 128e^{4x}$$

$$\begin{bmatrix} e^{x} & 2e^{2x} \\ e^{x} & 4e^{2x} \end{bmatrix}\begin{bmatrix} C_1 \\ C_2 \end{bmatrix} = \begin{bmatrix} \frac{dy}{dx} - 32e^{4x} \\ \frac{d^2y}{dx^2} - 128e^{4x} \end{bmatrix}$$

$$C_1 = \frac{\begin{vmatrix} \frac{dy}{dx} - 32e^{4x} & 2e^{2x} \\ \frac{d^2y}{dx^2} - 128e^{4x} & 4e^{2x} \end{vmatrix}}{\begin{vmatrix} e^{x} & 2e^{2x} \\ e^{x} & 4e^{2x} \end{vmatrix}} \Rightarrow \frac{4e^{2x}\left(\frac{dy}{dx} - 32e^{4x}\right) - 2e^{2x}\left(\frac{d^2y}{dx^2} - 128e^{4x}\right)}{2e^{3x}}$$

$$C_1 = 2e^{-x}\left(\frac{dy}{dx} - 32e^{4x}\right) - e^{-x}\left(\frac{d^2y}{dx^2} - 128e^{4x}\right)$$

$$C_1 = 2e^{-x}\frac{dy}{dx} - 64e^{3x} - e^{-x}\frac{d^2y}{dx^2} + 128e^{3x}$$

$$\boxed{C_1 = 2e^{-x}\frac{dy}{dx} - e^{-x}\frac{d^2y}{dx^2} + 64e^{3x}}$$

$$C_2 = \frac{\begin{vmatrix} e^{x} & \frac{dy}{dx} - 32e^{4x} \\ e^{x} & \frac{d^2y}{dx^2} - 128e^{4x} \end{vmatrix}}{2e^{3x}}$$

$$C_2 = \frac{e^{x}\left(\frac{d^2y}{dx^2} - 128e^{4x}\right) - e^{x}\left(\frac{dy}{dx} - 32e^{4x}\right)}{2e^{3x}}$$

$$C_2 = \frac{1}{2}e^{-2x}\frac{d^2y}{dx^2} - 64e^{2x} - \frac{1}{2}e^{-2x}\frac{dy}{dx} + 16e^{2x}$$

$$\boxed{C_2 = \frac{1}{2}e^{-2x}\frac{d^2y}{dx^2} - \frac{1}{2}e^{-2x}\frac{dy}{dx} - 48e^{2x}}$$

$$y_g = C_1 e^{x} + C_2 e^{2x} + 8e^{4x}$$

$$y_g = \left(2\cancel{e^{-x}}\frac{dy}{dx} - \cancel{e^{-x}}\frac{d^2y}{dx^2} + 64e^{3x}\right)\cancel{e^{x}} + \left(\frac{1}{2}\cancel{e^{-2x}}\frac{d^2y}{dx^2} - \frac{1}{2}\cancel{e^{-2x}}\frac{dy}{dx} - 48e^{2x}\right)\cancel{e^{2x}} + 8e^{4x}$$

$$y = 2\frac{dy}{dx} - \frac{d^2y}{dx^2} + 64e^{4x} + \frac{1}{2}\frac{d^2y}{dx^2} - \frac{1}{2}\frac{dy}{dx} - 48e^{4x} + 8e^{4x}$$

$$2y = 4\frac{dy}{dx} - 2\frac{d^2y}{dx^2} + 128e^{4x} + \frac{d^2y}{dx^2} - \frac{dy}{dx} - 96e^{4x} + 16e^{4x}$$

$$\boxed{\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 48e^{4x}}$$

$$y_g = \underbrace{C_1 e^{x} + C_2 e^{2x}} + 8e^{4x} \quad \text{EDO(2)LccNH}$$

Regla de Oro $\quad y_{g/nh} = y_{g/h} + y_{p/q.}$

$$\frac{d^2y}{dx^2} + a_1\frac{dy}{dx} + a_2 y = Q(x)$$

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

$$\boxed{\begin{array}{l} y_{g/h} = C_1 e^{x} + C_2 e^{2x} \quad \text{EDO(2)LccH} \\ (m-1)(m-2)=0 \quad m^2-3m+2=0 \\ \frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 0 \end{array}}$$

$$y_{p/q} = 8e^{4x} \quad \frac{dy}{dx} = 32e^{4x} \quad \frac{d^2y}{dx^2} = 128e^{4x}$$

$$Q(x) \Rightarrow (128e^{4x}) - 3(32e^{4x}) + 2(8e^{4x})$$

$$Q(x) = (128 - 96 + 16)e^{4x} \Rightarrow 48e^{4x}$$

$$\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 48e^{4x}$$

$$y = C_1 e^{x} + C_2 e^{-x} - 2e^{-x} + 4e^{5x}$$

$$y = C_1 e^{x} + (C_2 - 2)e^{-x} + 4e^{5x}$$

$$y = C_{10} e^{x} + C_{20} e^{-x} + 4e^{5x} \quad . \quad - \quad .$$

$$y = c_1 e^{x} + c_2 x e^{x} + 6x^2 e^{x}$$

$$\left[\begin{array}{l} (m-1)^2 = 0 \quad m^2 - 2m + 1 = 0 \\ \dfrac{d^2y}{dx^2} - 2\dfrac{dy}{dx} + y = 0 \end{array}\right.$$

$$y = 6x^2 e^{x}$$

$$\frac{dy}{dx} = 6x^2 e^{x} + 12xe^{x}$$

$$\frac{d^2y}{dx^2} = 6x^2 e^{x} + 12xe^{x} + 12xe^{x} + 12e^{x}$$

$$= 6x^2 e^{x} + 24xe^{x} + 12e^{x}$$

$$Q(x) = \left(6x^2 e^{x} + 24xe^{x} + 12e^{x}\right) -$$

$$-2\left(6x^2 e^{x} + 12xe^{x}\right) + \left(6x^2 e^{x}\right)$$

$$= (6 - 12 + 6)\,x^2 e^{x} + (24 - 24)\,xe^{x} + (12)\,e^{x}$$

$$Q(x) = 12e^{x}$$

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 12e^{x} \qquad y = c_1 e^{x} + c_2 x e^{x} + 6x^2 e^{x}$$

Método de la Variación de los Parámetros

Método de los Parámetros Variables

$\rightarrow$ EDO(n)L $\left\{ \begin{matrix} cc \\ cv \end{matrix} \right\}$ NH.

Método de Coeficientes Indeterminados

$\rightarrow$ EDO(n)L cc NH $\quad Q(x)$ forma.