EDO(2) L cc NH

$$\frac{dy}{dx} + p(x)y = 0 \qquad y_g = C_1 e^{-\int p(x)dx}$$

$$\frac{dy}{dx} + p(x)y = q(x) \qquad \underbrace{y_g = Ce^{-\int p dx} + e^{-\int p(x)dx}\int e^{\int p(x)dx} q(x)\,dx}$$

$$y_{g/h} = C_1 e^{-\int p(x)dx}$$

$$y_{g/n-h} = \left[C_1 + \int e^{\int p(x)dx} q(x)dx\right] e^{-\int p(x)dx}$$

$$y_{g/n-h} = A(x)\, e^{-\int p(x)dx}$$

$$\boxed{y_{g/n-h} = y_{g/h} + y_{p/q}}$$

Regla de oro.

Método de los Parámetros Variables para resolver No homogéneas.

$$y_g = \underbrace{C_1 e^{2x} + C_2 e^{-2x}}_{y_{g/h}} + \underbrace{4e^{3x}}_{y_{p\,La}}$$

EDO(2) L cc NH.

$$y_h = C_1 e^{2x} + C_2 e^{-2x}$$ EDO(2) L cc H_{asociada}

$$y_p = 4e^{3x}$$

$$(m-2)(m+2) = 0$$ ECUACIÓN CARACTERÍSTICA

$$m^2 - 4 = 0$$

$$\frac{d^2y}{dx^2} - 4y = 0$$

$$\left.\begin{aligned} y &= 4e^{3x} \\ \frac{dy}{dx} &= 12e^{3x} \\ \frac{d^2y}{dx^2} &= 36e^{3x} \end{aligned}\right\} \quad \left[36e^{3x}\right] - 4\left[4e^{3x}\right] = Q(x)$$

$$Q(x) = 20e^{3x}$$

$$\boxed{\frac{d^2y}{dx^2} - 4y = 20e^{3x}} \longrightarrow \boxed{\frac{d^2y}{dx^2} - 4y = 0}$$

EDO(2) L cc NH.

$$y_{g/n\text{-}h} = \underbrace{C_1 e^{2x} + C_2 e^{-2x}} + \boxed{4e^{3x}}$$

$$\frac{d^2y}{dx^2} - 4y = 0$$

$$Q(x)$$

$$\frac{d^2y}{dx^2} - 4y = 20e^{3x}$$

$$\frac{d^2y}{dx^2} - 4y = 20e^{3x}$$

$$E.H \Rightarrow \frac{d^2y}{dx^2} - 4y = 0$$

$$Q = 20e^{3x}$$

$$m^2 - 4 = 0$$

$$(m-2)(m+2) = 0$$

$$y_h = C_1 e^{-2x} + C_2 e^{2x}$$

$$y_{n-h} = A(x) e^{-2x} + B(x) e^{2x}$$

$$y_{nh} = A(x)e^{-2x} + B(x)e^{2x}$$

$$\frac{dy}{dx} = -2A(x)e^{-2x} + 2B(x)e^{2x} + \left[A'(x)e^{-2x} + B'(x)e^{2x}\right] = 0$$

$$\frac{dy}{dx} = -2A(x)e^{-2x} + 2B(x)e^{2x} + (0) \quad ; \quad \boxed{A'(x)e^{-2x} + B'(x)e^{2x} = 0}$$

$$\frac{d^2y}{dx^2} = 4A(x)e^{-2x} + 4B(x)e^{2x} + \left[-2A'(x)e^{-2x} + 2B'(x)e^{2x}\right] = Q(x)$$

$$\frac{d^2y}{dx^2} = 4A(x)e^{-2x} + 4B(x)e^{2x} + 20e^{3x} \quad : \quad \boxed{-2A'(x)e^{-2x} + 2B'(x)e^{2x} = 20e^{3x}}$$

$$A'(x)e^{-2x} + B'(x)e^{2x} = 0 \qquad A'(x) = -B'(x)\frac{e^{2x}}{e^{-2x}}$$

$$-2A'(x)e^{-2x} + 2B'(x)e^{2x} = 20e^{3x}$$

$$\begin{bmatrix} e^{-2x} & e^{2x} \\ -2e^{-2x} & 2e^{2x} \end{bmatrix} \begin{bmatrix} A'(x) \\ B'(x) \end{bmatrix} = \begin{bmatrix} 0 \\ 20e^{3x} \end{bmatrix}$$

$$4B'(x)e^{2x} = 20e^{3x}$$

$$B'(x) = \frac{20e^{3x}}{4e^{2x}} \Rightarrow 5e^{x}$$

$$A'(x)e^{-2x} = -\left[5e^{x}\right]e^{2x}$$

$$A'(x) = -\frac{5e^{3x}}{e^{-2x}} \Rightarrow -5e^{5x}$$

$$A(x) = \int -5e^{5x}dx \Rightarrow -5\left(\frac{e^{5x}}{5}\right) + C_1$$

$$B(x) = \int 5e^{x}dx \Rightarrow 5\left[e^{x}\right] + C_2$$

$$y_{gral} = \left(-e^{5x} + C_1\right)e^{-2x} + \left(5e^{x} + C_2\right)e^{2x}$$

$$y = C_1e^{-2x} + C_2e^{2x} + 4e^{3x}$$