MPU

$$\frac{dy}{dx} + p(x)y = 0$$

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

$$\downarrow$$

$$y_h = C_1 e^{-\int p(x)dx}$$

$$\uparrow$$

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

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

$$y_{n-h} = \left(C_1 + \underbrace{\int e^{\int p(x)dx} q(x)\,dx}\right) e^{-\int p(x)dx}$$

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

$$\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 4e^x \quad \text{EDO(2)LCC NH}$$

$$\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0$$

$$m^2 - 5m + 6 = 0$$

$$(m-2)(m-3) = 0$$

$$m_1 = 2 \quad m_2 = 3 \quad m_1 \neq m_2 \in \mathbb{R}$$

$$y_h = C_1 e^{2x} + C_2 e^{3x}$$

$$y_{n-h} = A(x)e^{2x} + B(x)e^{3x} \qquad Q(x) = 4e^x$$

$$\mathcal{M}_1(x)e^{2x} + \mathcal{M}_2(x)e^{3x}$$

$$y_{n-H} = A(x)e^{2x} + B(x)e^{3x}$$

$$\frac{d}{dx}$$

$$\frac{dy}{dx} = 2A(x)e^{2x} + 3B(x)e^{3x} + \underbrace{\boxed{A'(x)e^{2x} + B'(x)e^{3x}}}_{=0}$$

$$\frac{dy}{dx} = 2A(x)e^{2x} + 3B(x)e^{3x} + (0)$$

$$\frac{d}{dx}$$

$$\frac{d^2y}{dx^2} = 4A(x)e^{2x} + 9B(x)e^{3x} + \underbrace{\boxed{2A'(x)e^{2x} + 3B'(x)e^{3x}}}_{=Q(x)}$$

$$\frac{d^2y}{dx^2} = 4A(x)e^{2x} + 9B(x)e^{3x} + 4e^{x}$$

$$\frac{d^2y}{dx^2} \Leftrightarrow 4A(x)e^{2x}+9B(x)e^{3x}+4e^{x}$$

$$+$$

$$-5\frac{dy}{dx} \Leftrightarrow -10A(x)e^{2x}-15B(x)e^{3x}+(0)$$

$$+$$

$$+6y \Leftrightarrow 6A(x)e^{2x}+6B(x)e^{3x}$$

$$=$$

$$4e^{x} \Leftrightarrow (0)A(x)e^{2x}+(0)B(x)e^{3x}+4e^{x}$$

$$A'(x)e^{2x} + B'(x)e^{3x} = 0$$
$$2A'(x)e^{2x} + 3B'(x)e^{3x} = 4e^{x}$$

$$\underbrace{\begin{bmatrix} e^{2x} & e^{3x} \\ 2e^{2x} & 3e^{3x} \end{bmatrix}}_{W} \begin{bmatrix} A'(x) \\ B'(x) \end{bmatrix} = \begin{bmatrix} 0 \\ 4e^{x} \end{bmatrix}$$

$$A'(x) = \frac{\begin{vmatrix} 0 & e^{3x} \\ 4e^{x} & 3e^{3x} \end{vmatrix}}{|W|} \Rightarrow \frac{-4e^{4x}}{e^{5x}} \Rightarrow -4e^{-x}$$

$$B'(x) = \frac{\begin{vmatrix} e^{2x} & 0 \\ 2e^{2x} & 4e^{x} \end{vmatrix}}{e^{5x}} \Rightarrow \frac{4e^{3x}}{e^{5x}} \Rightarrow 4e^{-2x}$$

$$A'(x) = -4e^{-x} \qquad B'(x) = 4e^{-2x}$$

$$A(x) = -4\int e^{-x}dx \qquad B(x) = 4\int e^{-2x}dx$$

$$= -4\left[\frac{e^{-x}}{-1}\right] + C_1 \qquad B(x) = 4\left(\frac{e^{-2x}}{-2}\right) + C_2$$

$$\boxed{A(x) = 4e^{-x} + C_1} \qquad \boxed{B(x) = -2e^{-2x} + C_2}$$

$$y_{nh} = A(x)e^{2x} + B(x)e^{3x}$$

$$y_{nh} = (4e^{-x} + C_1)e^{2x} + (-2e^{-2x} + C_2)e^{3x}$$

$$\boxed{y_{nh} = \underbrace{C_1e^{2x} + C_2e^{3x}}_{y_h} + 2e^{x}}$$

$$\begin{bmatrix} e^{-x} & \cos(x) & \operatorname{sen}(x) \\ -e^{-x} & -\operatorname{sen}(x) & \cos(x) \\ e^{-x} & -\cos(x) & -\operatorname{sen}(x) \end{bmatrix} \begin{bmatrix} A \\ B \\ D \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ Q \end{bmatrix}$$