

$$y = c_1 e^{3x} + c_2 e^{2x}$$

$$\frac{dy}{dx} = 3c_1 e^{3x} + 2c_2 e^{2x}$$

$$\frac{d^2 y}{dx^2} = 9c_1 e^{3x} + 4c_2 e^{2x}$$

$$\begin{bmatrix} 3e^{3x} & 2e^{2x} \\ 9e^{3x} & 4e^{2x} \end{bmatrix} \begin{bmatrix} c_1 \\ c_2 \end{bmatrix} = \begin{bmatrix} \frac{dy}{dx} \\ \frac{d^2 y}{dx^2} \end{bmatrix}$$

$$c_1 = \frac{\begin{vmatrix} \frac{dy}{dx} & 2e^{2x} \\ \frac{d^2 y}{dx^2} & 4e^{2x} \end{vmatrix}}{\begin{vmatrix} 3e^{3x} & 2e^{2x} \\ 9e^{3x} & 4e^{2x} \end{vmatrix}} \Rightarrow \frac{4e^{2x} \frac{dy}{dx} - 2e^{2x} \frac{d^2 y}{dx^2}}{12e^{3x}e^{2x} - 18e^{3x}e^{2x}}$$

$$c_1 = \frac{\cancel{e^{2x}} (4 \frac{dy}{dx} - 2 \frac{d^2 y}{dx^2})}{-6 \cancel{e^{2x}} e^{3x}} \Rightarrow \frac{4 \frac{dy}{dx} - 2 \frac{d^2 y}{dx^2}}{-6 e^{3x}}$$

$$c_2 = \frac{\begin{vmatrix} 3e^{3x} & \frac{dy}{dx} \\ 9e^{3x} & \frac{d^2 y}{dx^2} \end{vmatrix}}{-6 e^{2x} e^{3x}} \Rightarrow \frac{3e^{3x} \frac{d^2 y}{dx^2} - 9e^{3x} \frac{dy}{dx}}{-6 e^{2x} e^{3x}}$$

$$c_2 = \frac{\cancel{e^{3x}} (3 \frac{d^2 y}{dx^2} - 9 \frac{dy}{dx})}{-6 \cancel{e^{3x}} e^{2x}} \Rightarrow \frac{3 \frac{d^2 y}{dx^2} - 9 \frac{dy}{dx}}{-6 e^{2x}}$$

$$y = \frac{4 \frac{dy}{dx} - 2 \frac{d^2 y}{dx^2}}{-6 \cancel{e^{3x}}} \cdot (\cancel{e^{3x}}) + \frac{3 \frac{d^2 y}{dx^2} - 9 \frac{dy}{dx}}{-6 \cancel{e^{2x}}} \cdot (\cancel{e^{2x}})$$

$$y = -\frac{4}{6} \frac{dy}{dx} + \frac{2}{6} \frac{d^2 y}{dx^2} - \frac{3}{6} \frac{d^2 y}{dx^2} + \frac{9}{6} \frac{dy}{dx}$$

$$y = \left(-\frac{4}{6} + \frac{9}{6}\right) \frac{dy}{dx} + \left(\frac{2}{6} - \frac{3}{6} \frac{d^2 y}{dx^2}\right)$$

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

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

F.D.O

$$y = c_1 e^{3x} + c_2 e^{2x}$$