

Assignment 1

$$\textcircled{1} \quad \frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = 8$$

$$y'' - y' - 2y = 8$$

Let $y = e^{kx} \Rightarrow$ for homogeneity.

$$y' = ke^{kx}$$

$$y'' = k^2 e^{kx}$$

$$\therefore k^2 e^{kx} - k e^{kx} - 2 e^{kx} = 0$$

$$(k^2 - k - 2) e^{kx} = 0$$

$$k^2 - k - 2 = 0$$

$$\underbrace{-2k^2 = -2k/k}$$

$$(k-2)(k+1) = 0$$

$$k = 2, \quad k = -1$$

$$y = C_1 y_1 + C_2 y_2$$

$$y_1 = e^{k_1 x} = e^{2x}$$

$$y_2 = e^{k_2 x} = e^{-x}$$

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

for non-homogeneity

$$y = A$$

$$y' = 0$$

$$y'' = 0$$

$$-2A = 8$$

$$A = -4$$

$$y = -4$$

$$\therefore y = y_p + y_n$$

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