

$$3(a) \quad y'' - 2y' + 5y = 10x + 1$$

$$\rightarrow \lambda^2 - 2\lambda + 5 = 0$$

$$\Rightarrow \lambda = \frac{2 \pm \sqrt{4 - 20}}{2} = 1 \pm 2i$$

\therefore Homog. gen soln (complementary)

$$y_c = e^x [c_1 \cos(2x) + c_2 \sin(2x)]$$

$$y_p = Ax + B, \quad y' = A, \quad y'' = 0$$

$$\text{Sub into d.e.} \Rightarrow -2A + 5Ax + 5B = 10x + 1$$

$$\Rightarrow 5A = 10 \text{ and } -2A + 5B = 1 \Rightarrow A = 2, B = 1$$

$$\therefore y_p = 2x + 1$$

$$y = e^x [c_1 \cos(2x) + c_2 \sin(2x)] + 2x + 1$$