

Find the general solutions of the following differential equations.

1.  $\frac{d^2 y}{dx^2} - 2\frac{dy}{dx} + 3y = 0$  (20%)

2.  $4x^2 \frac{d^2 y}{dx^2} + 8x \frac{dy}{dx} + y = 0$  (20%)

3.  $(x^3 + y^3)dx + 3xy^2 dy = 0$  (20%)

4.  $\frac{d^2 y}{dx^2} - 2\frac{dy}{dx} = e^x \sin x$  (20%)

5. Use the method of Laplace transform to solve

$$y'' - 3y' + 2y = 4e^{2t}; \quad y(0) = -3, \quad y'(0) = 5. \quad (20\%)$$