

Find the general solutions of the following differential equations.

1.  $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 13y = 0$  (20%)

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

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

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

5. Solve  $y'' + 4y = 0$  by the power series method. (20%)