1. \[ \frac{d^2 y}{dx^2} - 6 \frac{dy}{dx} + 9y = 0 \]

2. Solve the differential equation \[ \frac{d^2 y}{dx^2} + y = 8e^x. \]
3. Solve the differential equation: \( x^2 \frac{d^2 y}{dx^2} - x \frac{dy}{dx} - 3y = 0 \)

4. Solve the differential equation: \( \frac{d^3 y}{dx^3} + \frac{d^2 y}{dx^2} + 4 \frac{dy}{dx} + 4y = 0 \).
5. Solve the differential equation \( \frac{d^2 y}{d \theta^2} + 16y = \tan \theta \).

6. Solve the differential equation \( x^2 \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} - 2y = 6x^{-2} + 3x \)
7. Given that $xe^{2x}, e^{2x}$ are solutions determine if they are linearly independent or linearly dependent on the interval $0 < x < \infty$ and write the general solution.

b. Are the solutions $e^x, e^{2x}, e^{-3x}$ linearly independent or linearly dependent. Write the general solution.