Show all your work in answering the following questions. Simply writing the answer is not acceptable. Staple all your pages together. The professor is not responsible for lost pages.

1. Determine whether or not the following function is a solution of the differential equation:
   (a) \( \frac{dy}{dx} + y = e^x \) and \( y = xe^x + 2e^x \)
   (b) \( \frac{dy}{dx} + 2y = e^{-2x} \) and \( y = xe^{-2x} + 3e^{-2x} \)

2. Solve the following differential equations subject to the given conditions
   (a) \( \frac{dy}{dx} = 3\sqrt{x} \), with \( y = 2 \) when \( x = 1 \)
   (b) \( \frac{dy}{dx} = \csc^2 x \), with \( y = 2 \) when \( x = \pi/4 \)

3. Find the general solution of the following equations
   (a) \( 2 + (x^2y - x^2)\frac{dy}{dx} = 0 \)
   (b) \( \frac{dy}{dx} + y\sin 2x = \sin 2x \)

4. Find the particular solution of the equation subject to the given conditions
   (a) \( (y + 2)dx + (x - 3)dy = 0 \), with \( y = 5 \) when \( x = 2 \)
   (b) \( \frac{dy}{dx} + \frac{2y}{x} = \frac{e^x}{x^2} \), with \( y = 2 \) when \( x = 1 \)

5. A body whose temperature is 25°C is placed outside where the temperature is 0°C. One minute later the temperature of the body has dropped to 22°C. What will the temperature be after 10 min?