Differential Equations
Test 1 sample

Answer FOUR questions and show all work.
’Solve’ means find the general solution, involving an arbitrary constant.

1. Solve the differential equation \( \frac{dx}{dt} = x - x^2 \).

2. Solve the IVP: \( \frac{dy}{dx} + y = \frac{1}{1 + e^{2x}} \); \( y(0) = \pi/4 \).

3. Find which value of the constant \( \lambda \) makes the equation
   \[(x + ye^{2xy})dx + \lambda xe^{2xy}dy = 0\]
   exact and then solve the equation for this value of \( \lambda \).

4. Solve the differential equation \( x^2 \frac{dy}{dx} = y^2 + 2xy \).

5. Solve the differential equation \( xdy + ydx = xy^2 dx \).