DIRECTIONS To receive full credit, you must provide complete legible solutions to the following problems in the space provided. Transfer all your answers to the space provided on the test paper

Solve the given differential equation by separation of variables.

a. $dy - (y - 9)^2 \, dx = 0$

b. $(e^y + 1)^2 e^{-y} dx + (e^x + 1)^8 e^{-x} dy = 0$

c. $\dfrac{dp}{dt} = P - P^2$

2.   Find an explicit solution of the given initial-value problem.

a. $\dfrac{dx}{dt} = (x^2 + 1), \quad x(\dfrac{\pi}{4}) = 1$

b. $x^2 \dfrac{dy}{dx} = y - xy, \quad y(-1) = -5$

3.   Convert the given equation to an integral equation.

$\dfrac{dy}{dx} = y^2 sin(x^2), \quad y(-4) = \dfrac{1}{6}$