

Instructions: Show Your Work!

1. (3 pts) Solve the initial-value problem

$$y^{1/2} \frac{dy}{dx} + y^{3/2} = 1, \quad y(0) = 4$$

2. (3 pts) Solve

$$x^2 \frac{dy}{dx} - y^2 = -xy^2$$

3. (4 pts) Solve the initial-value problem

$$(1 + x^2) \frac{dy}{dx} + 2xy = f(x), \quad y(0) = 0$$

where

$$f(x) = \begin{cases} x, & 0 \leq x \leq 1, \\ -x, & x > 1. \end{cases}$$
