

Math 240 - Quiz 2
January 26, 2023

Name _____

Score _____

Supply explanations if necessary.

1. (3 points) Solve the following initial value problem:

$$\frac{dy}{dx} = \frac{10}{x^2 + 1}, \quad y(0) = 0$$

2. (3 points) Suppose you are sketching the direction field for the differential equation

$$x^2 \frac{dy}{dx} + 3xy^3 = 4.$$

- (a) What is the slope of the solution curve passing through $(2, 3)$?
- (b) Find a point through which you would not expect a solution curve to exist. Say why.

Turn over.

3. (4 points) Analyze each initial value problem and determine whether we could expect a unique solution, more than one solution, or no solution to exist through the given point.

(a) $\frac{dy}{dx} - x^2y = \sin^3 x, \quad y(\pi) = 2$

(b) $y\frac{dy}{dx} = e^x, \quad y(1) = 0$