

Name: _____ ID number: _____

1. Which of the following is NOT modeled by a second-order linear ordinary differential equation?
 - (a) the height of an object falling under the force of gravity
 - (b) the charge in an RLC electric circuit
 - (c) the pressure in a star
 - (d) the displacement of a vibrating string
2. How many of the following statements are true?
 - If an initial value problem for a first-order differential equation has a solution, then the solution is unique.
 - A differential equation always has an implicit solution.
 - A differential equation typically has infinitely many solutions.
 - The initial value problem

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

has a unique solution for x near 0.

- (a) None (b) One (c) Two (d) Three (e) Four

3. How many of the following statements are true?
 - A direction field plot provides sufficient information to trace unambiguously the solution curve passing through a given initial point (x_0, y_0) .
 - A solution curve for a differential equation $y' = f(x, y)$ is called an isocline.
 - Euler's method is a procedure for constructing approximate numerical solutions to an initial value problem for a first-order differential equation.
 - Solution curves of the differential equation

$$\frac{dy}{dx} = x^2 - xy^3$$

cannot cross each other.

- (a) None (b) One (c) Two (d) Three (e) Four