

**Directions:** Please answer the following questions to the best of your ability. Provide reasoning when asked. Quizzes will all be 15 points each. A calculator is necessary for portions of the quiz.

1. **(3 points)** Select the statement that BEST describes what the derivative of a function measures:
  - a. The derivative is a measure of equilibrium
  - b. The derivative is a measure of the rate of change of  $y$  with respect to  $x$
  - c. The derivative is negative when something is increasing very slowly
  - d. The derivative is positive whenever something is in motion
2. **(3 points)** Select the statement that is TRUE:
  - a. When a function is increasing its derivative is positive
  - b. The derivative always exists as long as the function exists
  - c. The derivative is 0 at all maximum or minimum values
  - d. If the  $y$  values of a function are all positive, its derivative is positive everywhere
3. **(3 points)** Select the answer that BEST describes “total cost” in a business setting:
  - a. The total cost function is marginal cost + fixed cost
  - b. The total cost function is the derivative of marginal cost
  - c. The total cost function always decreases
  - d. The total cost function is fixed cost + variable cost
4. **(3 points)** Given that  $f(x) = y = \frac{90}{x^2+1}$  and  $f'(x) = \frac{dy}{dx} = \frac{-180x}{(x^2+1)^2}$

what is the slope of the graph of  $f(x)$  at  $x = 4$  ?

What is the  $y$  coordinate of the graph at  $x = 4$  ?

5. **(3 points)** The total cost to produce “ $x$ ” items is given by  $C(x) = 52 + 12x$

What is the fixed cost?

What is the variable cost?

What is the unit cost (cost per item)?

Formula for Unit Cost:  $Unit(x) = \frac{\text{Total Cost}}{x} = \frac{C(x)}{x} = C(x) \div x$