

Math 1100 Test 1

Name: _____

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Directions: Work all problems included. If you need more room use the back of the page to complete the problem. You may use a calculator for computing numerical values. However, you may not use calculators for symbolic calculations unless the problem indicates this can be done. For full credit you must show all work including algebraic steps.

Problem 1: Compute the limit of the polynomial shown below at $x = 1$.

$$\lim_{x \rightarrow 1} x^2 - 2x + 1$$

Problem 2: a. State the domain of the following function.

$$g(x) = \frac{x^2 - 4x + 3}{x - 1}$$

b. Is the function continuous at all points in the domain? Explain your answer.

Problem 3: Write the definition of the derivative of a function f at a point, x . Use the definition of the derivative to compute the derivative of the following function.

$$f(x) = x^2 + 3$$

Problem 4: Compute the derivative of the following function

$$f(x) = 4x^3 - 2x^2 + x - 1$$

Evaluate the derivative at the point $x = 1$. Then compute the equation of the tangent line to the graph of the curve at $x = 1$.

Problem 5: The cost function for producing a number of items is defined by

$$C(x) = 5000 + 20x$$

and the function is given by

$$R(x) = 1000x$$

Write Compute the marginal cost, revenue, and function from this cost function.

Problem 6: Compute the derivative of the following function using the quotient rule.

$$h(x) = \frac{5x + 3}{2x^2 + 3}$$

Problem 7: The velocity (in feet per second) of an automobile starting from rest is modeled by

$$\frac{ds}{dt} = \frac{90t}{t + 10}$$

Determine the acceleration for the velocity of the automobile from this formula.

Problem 8: Given the equation

$$x^2 - 5xy + y^2 = -5$$

compute $\frac{dy}{dx}$ using implicit differentiation. Compute the slope of the tangent line to the graph of the solution set of the equation at the point $(3, 1)$. Write the equation of the tangent line at this point.

Problem 9: The sales, S , for a company can be modeled by

$$S = 1275 + 45x + 0.25x^2$$

where x gives the advertising costs associated with selling the product. If the rate of change in advertising are increasing at a rate of \$100 per week find the rate of change in sales.

Problem 10: Compute the one-sided limit of the function shown below at $x = 2$.

$$\lim_{x \rightarrow 2^+} \frac{x^3 + x^2 + x}{x - 2}$$