

MATH 144 Spring 2009  
Exam 2 Review

Name:

1. Find the critical points of  $y = x^3 - 3x^2 + 1$ . You do **not** need to test or classify them.

2. Sketch the graph of the function  $y = x^4 - 2x^2 + 2$ , including all critical points and inflection points. **Justify** your work.

3. Find and classify the critical points of  $f(x) = \frac{1}{5}x^5 - \frac{1}{2}x^4 + 3$ . You do **not** need to sketch the graph of the function.

4. If the total profit function for a product is  $P(x) = -x^3 - \frac{45}{2}x^2 + 300x$ , producing how many units will result in a maximum profit? **Justify** your answer.

5. Sketch the graph of  $f(x) = \frac{x}{(x-1)^2}$ . Find, label, and classify all asymptotes, critical values, and critical points. You do not need to find points of inflection.

In problems 6-10, find the derivative. You do not need to simplify your answers.

6.  $y = \ln(5x^2 - 9x + 61)$

7.  $y = \ln\left(\frac{x+3}{x-3}\right)$

8.  $y = e^{6x^2 - 7x}$

9.  $y = (2x^2 + 1)e^{5x}$

10.  $y = (e^{8x} + 3x)^{15}$

11. A garden of 120 total square feet is to be fenced in with a divider across the middle. The total installed cost of the fence is \$5 per foot for all four sides of the outer fence and \$2 per foot for the center divider. (See next page for part b of the problem.)

a. What dimensions will minimize the cost?

b. What is the minimum cost?

12. If the Revenue Function for a product is  $250x - .1x^2$  and the Cost Function is given by  $150x + .1x^2 + 10$ , then the Profit Function will be given by  $100x - .2x^2 - 10$ . Use this information to find the following:

a) Find the amount of products that need to be produced to maximize Revenue.

b) Find the minimum for the average cost.

c) Find the amount of products for which the Profit will be maximized.

13. Two equal rectangular lots are enclosed by fencing the perimeter of a rectangular lot and then putting a fence across its middle. If each lot is to contain at least 1200 square feet, what is the minimum amount of fence needed to enclose the lots (include the fence across the middle)?