MATH 1120 **Test 2** **Fall 2000**

Name : _____

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1. Let $f(x) = -2x^3 - 3x^2 + 12x - 1$.

   (a) Find the interval(s) where $f(x)$ is increasing and the interval(s) on which it is decreasing.

   (b) Find the relative maxima and relative minima, if any.

2. Let $f(x) = x^4 + 2x^3 - 5$. Find the interval(s) where $f(x)$ is concave upward, and the interval(s) on which it is concave downward.

3. Find the absolute maximum and the absolute minimum of $f(x) = \frac{x}{x^2+1}$ on the interval $[0, 3]$.

4. A man wishes to have a rectangular-shaped 1200-square-foot garden in his backyard. One side will be formed by a portion of the external wall of his house, the two sides starting from the wall will be constructed of pine boards, and the fourth side will be made of galvanized steel fencing material. If the pine board fencing costs \$6 per running foot and the steel fencing costs \$4 per running foot, determine the dimensions of the enclosure that can be erected at minimum cost.

5. (a) Compute the future value after 10 years on \$4000 invested at 6% interest compounded monthly.

   (b) Find the effective rate corresponding to 7% per year compounded daily.

6. Solve the equations for x:

   (a) $3^x = (\frac{1}{9})^{x-3}$

   (b) $5e^{3x} = 25$

7. Find the derivatives of the following functions

   (a) $e^{5x} + \ln x$

   (b) $\ln(x^4 + 4)$

   (c) $x^3 e^{x^2}$

   (d) $x^2 \ln(x^3 + 1)$

   (e) $\frac{\ln x}{\ln x + 1}$

8. The amount of carbon 14 present at any time t obeys the law $Q(t) = Q_0 e^{-0.00012t}$. Wood deposits recovered from an archeological site contain 20% of the carbon 14 they originally contained. How long ago did the tree from which the wood was obtained die?