Math M119 Section 22611   *Practice Exam 2*   *March 10, 2010*

Follow the instructions for each question and show enough of your work so that I can follow your thought process. If I can't read your work or answer, you will receive little or no credit!

For problems 1-6 find the derivative of the following functions with respect to the indicated variable.

1. $f(x) = x^3 - 3x^2 + 5x - 1$

2. $s(t) = (t^3 + 2)(3t - 2)$

3. $h(x) = \dfrac{2 - x^3}{4 + 3x^6}$

4. $g(r) = re^{5r}$

5. $u(x) = \ln(x^2 + 1)$

6. $P(t) = \ln(2) \cdot 2^t + t^2$

7. Suppose that Fanny the fencer has 1000 feet of fencing and she wants to enclose a rectangular region. What is the largest area she can enclose?

8. At a price of $10 per ticket, the Purdue musical theater group can fill every seat in Elliot Hall of Music, which has a capacity of 3500. For every additional dollar charged, the number of people buying tickets decreases by 80. What ticket price maximizes revenue?

9. Given that $f(x) = 8x^2 - x^4$, curve sketch it, i.e. find all critical points, critical values, inflection points, on which intervals f is increasing and/or decreasing, on which intervals f is concave up and/or down, and all local extrema.

10. Given that $f(x) = x + \dfrac{1}{x}$, find the exact global maximum and/or minimum of f on $x > 0$.

11. Gauss' great steak emporium has cost and revenue functions, $C(q) = 3q^2 + \dfrac{q}{300} - 1$ and $R(q) = 3q^2 + \ln(q)$ respectively. At what quantity sold is the maximum profit achieved?