Math 180 F

FOURTH HOUR EXAM

NAME____

General Notes:

1. Show work.
2. Look over the test first, and then begin.
3. Calculators are not permitted on this exam.

Friday, Dec. 4, 2009
100 pts

I. Optimization

1. A field is to be fenced using 100' of fencing. Happily, a river with an unusually straight bank takes up one side of the field. Using the 100' feet of fencing to fence the remaining three sides of a rectangular field, we want to find the dimensions of the largest area that can be enclosed.

   a. (5 pts.) Sketch a picture of the situation, labeling what you can.

   b. (15 pts.) Find the dimensions of the largest rectangular field we can enclose under these conditions.

II. **l'Hôpital's rule**

1. (5 pts. each) Use **l'Hôpital's rule** to find the following limits. <u>Show your work</u>:

$$\lim_{x\to\infty}\frac{2x^2-3x+1}{4x^2-17x+15}$$

$\lim_{x\to 0^+} x^x$ (problem 55)

III. Newton's Method

1. (10 pts.) Suppose that we want to solve the equation $x^3 - x = 0$. We use Newton's method with an initial guess of $\frac{1}{2}$. What is the next guess?

IV. Antiderivatives (5 pts each) Find the following antiderivatives. Remember the constant of integration!

$$\int (x^3 + 3x^2 - 7x + 1)dx$$

$$\int \sinh(x)dx$$

$$\int e^x dx$$

$$\int \cos(x)dx$$

$$\int \frac{dx}{1+x^2}$$

V. Summations

1. (10 pts.) Evaluate $\sum_{k=1}^{10}(2k-1)$ to a number using the rules and formulae we have developed. Show your work.

VI. The definite integral

1. (15 pts.) Give a careful definition of a Riemann Sum for a function *f* on an interval [a,b], explaining all the parts of your definition.

2. (10 pts.) Using your definition in part (1) give a definition of $\int_a^b f(x)dx$ for a function *f(x)* on an interval [a, b]