# Math 122 D

# FIRST HOUR EXAM

NAME_____

General Notes:

1. Show work.
2. Look over the test first, and then begin.
3. No calculators on this exam.

Friday, Sept. 23, 2005
100 pts.

I. Review (10 pts. each)

1. Give a formal definition of
$\lim_{x \to a} f(x) = L$

2. Informally, what does it mean to say that f(x) is continuous at a point **a**?

II. Definitions, tools and the like

1. (10 pts.) Calculate $\sum_{k=1}^{5} (2k+1)$ to a number using the rules of summation and the formulas we have studied.

II. Definitions, tools and the like (continued)

2. (5 pts.) What is a partition? What is the norm of a partition?

3. (5 pts.) Write down the general form of a Riemann sum.

4. (5 pts.) Define $\int_a^b f(x)dx$

4. (10 pts.) Suppose that we are trying to solve the equation $x^2 - 5 = 0$ (i.e., we are trying to find the square root of 5). If we use Newton's method with an initial guess of 5, what is our next guess (using Newton's method, also known as the Newton-Raphson method)

III. Find the following antiderivatives (5 pts. each) Remember the constant of integration. Show work.

a. $\int (x^2 + 4x + 1)dx$

b. $\int \cos\theta \, d\theta$

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

III. (Antiderivatives, continued)

d. $\int \frac{\ln|x|}{x}\,dx$

e. $\int x\sqrt{1+x}\,dx$

.III. (5 pts. each) Calculate the following definite integrals. Show work.

a. $\int_1^2 x^2\,dx$

b. $\int_0^{\pi/2} \sin^3\theta\cos\theta\,d\theta$

c. $\int_0^{\ln(5)} e^x\,dx$

IV. (5 pts.) What is the name of the theorem that enables you to do the problems in part III above?