Math 180 F

FIRST   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. Carry out any calculations to the point at which you would need a calculator (for example, to take the square root of the logarithm of a number) and leave it in that form.
4. I will probably not be here when you take this exam (I will be working on the other side of campus on Homecoming). If a problem appears to be ambiguous, please give it your best interpretation (and write that interpretation down on the exam) and then solve it.

Friday, Sept. 26, 2008
100 pts.

I. Functions

1. (5 pts. each)

a) What is a function? Give an informal (but complete) definition

For parts b, c, and e (part e is on the next page), let $f(x) = 2x^2 + 1$ and $g(x) = 7x + 5$. Please give your answers to the following in terms of x (i.e., give your answers as functions).

b. What is $(f - g)(x)$?

c. What is the composition $f \circ g$ of functions f and g?

(problem I.1, continued)

d. What does it mean to say that one function h(x) is the inverse of another function g(x)?

e. Find the inverse of the g from the previous page. Please write your response as a function of x.

2. Simplify the following expressions to a number (5 pts. each - remember - no calculators)

   a. $\log_2(8*16)$ (* means multiply)

   b. $\log_2 8^{15}$

   c. $e^{\ln(27)}$ (remember that $\ln(x) = \log_e(x)$)

3. Solve for x as far as you can without using a calculator (5 pts)

   $$3e^{2x} = 42$$

4. Please give numeric answers (which may include square roots) to the following

a. (5 pts.) What is $\tan(\dfrac{\pi}{3})$

b. (10 pts) What is $\cos(\dfrac{\pi}{4} + \dfrac{\pi}{6})?$.

II. Limits and the like

1. (5 pts.) Give an informal definition of
$\lim_{x \to a} f(x) = L$ as you would explain it to an intelligent friend who has not yet taken Math 180.

2, (5 pts. each) Find the following limits:

a. $\lim_{x\to 1}(x^2 + 7x - 3)$

b. $\lim_{x\to 2}\dfrac{x^2 - x - 2}{x - 2}$

c. $\lim_{h\to 0}\dfrac{(3+h)^2 - 9}{h}$

d. $\lim_{h\to 0}\dfrac{\sqrt{h+1} - 1}{h}$

3. (5 pts.)

   d. Suppose that $x(t) = \cos(t)$. Calculate the average rate of change of x(t) on the interval $[0,\pi]$?

III. Getting ready for a future exam (10 pts.)

   A box is to be made from a square piece of tin 10" on a side. The box is formed by cutting out squares from each of the four corners of the piece of tin and then folding up the sides. Suppose that each of the four squares cut out is **x**" on a side.

   a. Sketch a picture of the situation.

   b. Calculate the volume of the resulting box as a function of **x**.