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.

Friday, Sept. 28, 2006
100 pts.

I. Functions

1. (5 pts. each except as noted)

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

    For parts b, c, and d (part d is on the next page), let $f(x) = x^2$ and $g(x) = 3x - 6$. 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. (10 pts.)   Find the inverse of g. Please write your response as a function of x.

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

a. $\dfrac{9^{(\frac{5}{2})}}{9^{(\frac{4}{2})}}$

b. $2^{\log_2(14)}$

(Problem I.2 continued)

d. $\ln(e^{12})$ (remember that $\ln(x) = \log_e(x)$)

e. simplify $\dfrac{(\sqrt{5h+4} - 2)(\sqrt{5h+4} + 2)}{h(\sqrt{5h+4} + 2)}$ after first doing the multiplication in the numerator
(upstairs part). (Do this as far as you can - you will still have square roots and h's and x's in your answer)

3. Solve for x (5 pts)

$$2^{3x} = 4$$

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

a. (5 pts.) What is $\sin(\frac{\pi}{3})$

b. (10 pts) What is $\sin(\frac{\pi}{3} - \frac{\pi}{4})$? .

II. Limits and the like

1. (5 pts.) Give an informal definition of
   $\lim\limits_{x \to a} f(x) = L$ 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. $\lim\limits_{x \to 1}(2x + 1)$

   b. $\lim\limits_{x \to 3} \dfrac{x^2 - 2x - 3}{x - 3}$

(continuation of problem II.2)

c. $\lim\limits_{h \to 0} \dfrac{(\sqrt{5h + 4} - 2)}{h}$ (hint: look at problem I.2 (e) on page 4 of this exam)

3. (5 pts.)

   d. Suppose that $x(t) = 16t^2 + 2t - 1$. What is the average rate of change of x(t) on the interval [0,1]?

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

A fence of length 100' is to surround a rectangular field. One side of the rectangle has length **x**. Please write a formula for the area of the field as a function of **x**. See the diagram below. Remember that the area of a rectangle is length times width.

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        ┌───┐
        │ ? │
  ┌───┐ ├───────┤ ┌───┐
  │ x │ │       │ │ x │
  └───┘ └───────┘ └───┘
        ┌───┐
        │ ? │
        └───┘
  ┌─────────────────────┐
  │ Total perimeter is 100 ft. │
  └─────────────────────┘
```