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.

Friday, Sept. 25, 2009
100 pts.

I. Functions

1. (5 pts. each)

   a) What is a function?

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

   c. What is the inverse of a function (if it exists)?

2. (5 pts.) Find the inverse to the function f(x) = 2x -4.

3. (5 pts.) What function is the inverse of the function $f(x) = e^x$?

4. (10 pts.) Let $f(x) = 2x^2 + 1$ and $g(x) = x + 1$. What is $f \circ g(x)$ in this case? Simplify your answer.

II. Logarithmic and trigonometric functions

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

   a. $\log_3 9^{27}$

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

2. Solve for x (5 pts)

   $3(2^{3x}) = 24$

4. (10 pts) Please give a numeric answer (which may include square roots) to the following

$$\sin(\frac{\pi}{4}-\frac{\pi}{6})?.$$

III. 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.

   Please incorporate distance in your explanation (remembering that this is only a five point question).

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

a. $\lim_{x\to 1}(3x^2 - 42x + 15)$

b. $\lim_{x\to 2}\dfrac{x^2 - 4}{x - 2}$

c. $\lim_{h\to 0}\dfrac{(2+h)^2 - 4}{h}$

3. (20 pts.) Find the equation of the line tangent to the curve $f(x) = x^2 + 1$ at the point x = 2. Please remember that this requires that you calculate (showing work) $\lim_{h \to 0} \frac{f(2+h) - f(2)}{h}$ **and** find the equation of a line.