Math 180 D

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 a square root or the logarithm of a number) and leave it in that form.

> Friday September 24, 2010
> 100 pts.

I. Some definitions (5 pts. each)

  a. What is a function?

  b. What is the domain of a function?

  c. What does it mean to say that a function is even? As **part** of your answer, give an example.

  d. What is a polynomial function?

  e. What is a rational function?

2. (10 pts.) Let $f(x) = x^2 - 1$ and $g(x) = 2x + 1$. 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. $\log_3 9^4$

   b. $2^{\log_2 42_2}$

3. (10 pts) Suppose that $\cos(\theta) = -\dfrac{1}{2}$ and that $\dfrac{\pi}{2} < \theta < \pi$. What are the values of $\sin(\theta)$ and $\tan(\theta)$ in this case (your answer may involve expressions involving square roots (remember - no calculators)).

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.) Give the formal definition (i.e., the $\delta - \varepsilon$) of $\lim\limits_{x \to a} f(x) = L$

3. (5 pts. each) Find the following limits. Show work.

a. $\lim\limits_{x \to 1} \dfrac{x^2 - 4}{x - 2}$

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

c. $\lim\limits_{h \to 0} \dfrac{\sqrt{2h + 4} - 2}{h}$

3. (15 pts.) Using the techniques covered so far in chapter 2, find the equation of the line tangent to the curve $f(x) = x^2 + 2$ at the point $(1,3)$. Do this in two parts

    a. (10 pts.) First, find $\lim\limits_{h \to 0} \dfrac{f(1+h) - f(1)}{h}$. This will give you the slope of the tangent line at the given point.

    b. (5 pts.)Next, use the slope from the first part and the information that $(1, 3)$ is on the graph (since f(1) = 3), to find the equation of the tangent line through $(1, 3)$.