Math 111, Introduction to the Calculus, Fall 2011
Midterm I Practice Exam 2

This exam is intended to give you an idea of the length and difficulty of the real thing. Please remember that topics not on covered here could definitely still appear on the exam on Friday. You should still do lots of other practice problems.

You will have 50 minutes for the exam and are not allowed to use books, notes or calculators. Each question is worth 10 points.

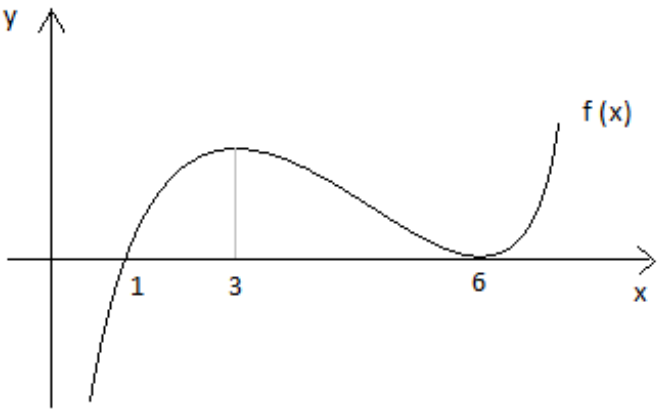
1. Prove, using the precise definition of limit, that the function

$$f(x) = -x$$

   is continuous at $x = 1$.

2. Find the equation of the tangent line to the graph of the function $f(x) = \frac{1}{x}$ at the point $(1, 1)$.

3. Below is a graph of the function f:



   (a) Sketch a graph of the function g where $g(x) = f(\frac{x}{2} + 1)$.

   (b) Sketch a graph of the function f'.

4. Find the value of each of the following limits, or explain why the limit is $+\infty$, or $-\infty$, or does not exist for another reason:

   (a) $\lim_{x \to 0} \frac{|x|}{x}$;

   (b) $\lim_{x \to 1} \frac{x^3 - 1}{x^2 - 1}$;

   (c) $\lim_{x \to 3^-} \frac{x - 4}{x - 3}$.

(Note that part (c) is a one-sided limit.) You should justify your answers.

5. John is driving from Boston to New York. The function $f(x) = 10x(10-x)$ for $0 \leq x \leq 4$ describes John's distance from Boston (measured in miles) at a time x hours after leaving. What is John's speed when he is 160 miles from Boston?