Math 111, Introduction to the Calculus, Fall 2011
Midterm I Practice Exam 1

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. (a) Use scaling and translation to sketch a graph of the following function for $-3\pi \leq x \leq 3\pi$

$$f(x) = \sin\left(\frac{x}{2} + \pi\right).$$

   (You should explain how you arrived at your answer. Note that it is not sufficient to create a table of values to plot this graph.)

   (b) At what points in $\mathbb{R}$ is this function continuous? (No explanation necessary.)

2. Calculate the following limit:
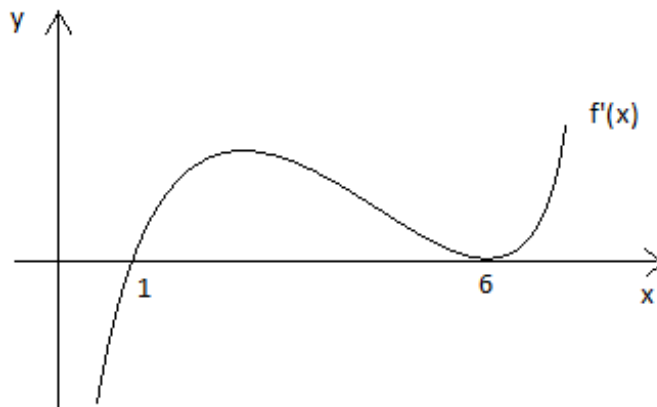$$\lim_{x \to 2} \frac{\sqrt{x^2 + 1} - \sqrt{5}}{x - 2}.$$

3. Prove, using the precise definition of limit, that:
$$\lim_{x \to 1}(1 - 5x) = -4.$$

4. Use the definition of derivative to find $f'(2)$ where
$$f(x) = x^2 + x.$$

5. Below is a graph of f' for some function f.

   Sketch two different possible graphs of the function f for the same range of x-values. (Make sure it is clear how your graphs are different, but also how they are related.)