Math 2200 (Lieman), Fall 2002, First Exam

Directions: This exam is worth 100 points. You will have one hour to complete this exam. You may **not** use calculators, but they will not be necessary. In order to receive full credit for an answer, you must show all of your work. If you need scratch paper, please use the extra page at the end of this exam. This exam should have 8 pages. *Good luck!*

Name:

Problem	Possible	Score
1	15	
2	15	
3	20	
4	20	
5	20	
6	10	
Total	100	

1. (15 points) Find the value of c that makes the following function continuous

$$f(x) = \begin{cases} x + 5, & x \leq 2 \\ x^2 + c & x > 2 \end{cases}$$

2. (15 points) This problem has two parts. The first part is worth ten points. The second part is worth five points. For both parts, the function $p(t)$ is a function that gives the location of a particle at time t, where

$$p(t) = 2t^3 + 7t + 1.$$

(a) Compute the derivative of $p(t)$ (usually denoted $\frac{dp}{dt}$ or $p'(t)$).

(b) What is the particle's velocity when $t = 3$?

3. (20 points) This problem has two parts, each worth ten points. For each part, you must evaluate a limit, or show it does not exist.

(a)

$$\lim_{x \to 4} \frac{x^2 + 2}{x - 2}$$

(b)

$$\lim_{x \to 4} \frac{\sqrt{x} - 2}{x - 4}$$

4. (20 points) This problem has two parts, each worth ten points. For each part, you must evaluate a limit, or show it does not exist.

(a)

$$\lim_{x \to 0} \frac{\sin(x)}{x}$$

(b)

$$\lim_{x \to 0} \frac{x^2}{1 - \cos^2(2x)}$$

5. (20 points) This problem has two parts, each worth ten points. For each part, you must evaluate a limit, or show it does not exist.

(a)

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

(b)

$$\lim_{x \to 3} \frac{1}{x-3}$$

6. (10 points) This problem has two parts, each worth five points. Both parts concern the function

$$f(x) = 3x^2 + 6x + 7.$$

(a) What is the slope of the tangent line to $f(x)$? (You may use either the slope-predictor method or derivatives to answer this question.)

(b) Where is the tangent line to $f(x)$ horizontal?

(scratch page)