MA 125 CT, CALCULUS I

January 21, 2010

Name (Print last name first): .....

Student Signature: .....

TEST I

No calculators are allowed!

PART I

Part I consists of questions. Clearly write your answer (only) in the space provided after each question. Show all of your your work!

All problems in Part I are 6 points each

Evaluate the following limits.

Question 1

$$\lim_{x\to 3} \frac{x^2 - x - 6}{x - 3}$$

Answer: .....

Question 2

$$\lim_{x\to 0} \frac{\sin(7x)}{3x}$$

Answer: .....

Question 3

$$\lim_{x\to\infty} \frac{-2x^4+3x^2-5}{x^4+7x}$$

Answer: .....

Question 4

$$\lim_{x\to 2} \sqrt[3]{[\ln(x)]^3+7}$$

Answer: .....

Question 5

$$\lim_{x\to 0} \frac{1}{|x|}$$

Answer: .....

Question 6

$$\lim_{x\to\infty} x^3+2x+7$$

Answer: .....

Question 7

$$\lim_{x\to\infty} \frac{\sin(x)}{x^2} =$$

Answer: .....

Question 8

$$\lim_{h\to 0} \frac{(5+h)^{-1} - 5^{-1}}{h}$$

Answer: .....

PART II

Part II consists of 3 problems. You must show correct reasons to get full credit. Displaying only the final answer (even if correct) without the relevant steps will not get full credit.

Problem 1 (18 points)

Given the graph of the function $y = f(x)$ below find:

1. $\lim_{x \to -1^-} f(x) =$
2. $\lim_{x \to -1^+} f(x) =$
3. $\lim_{x \to -1} f(x) =$
4. $\lim_{x \to 2^-} f(x) =$
5. $\lim_{x \to 2^+} f(x) =$
6. $\lim_{x \to 2} f(x) =$
7. $\lim_{x \to \infty} f(x) =$
8. State all intervals on which $f(x)$ is continuous.

Problem 2 (18 points)

You may use that $(3.1)^2 = 9.61$ and $(3.01)^2 = 9.0601$. If the position of a particle at time t is given by $S(t) = t^2$, find:

1. the average velocity $\overline{v}_{3,\ 3.1}$

2. the average velocity $\overline{v}_{3,\ 3.01}$

3. Using the above, estimate the instantaneous velocity $v(3)$.

Problem 3 (16 points)

Evaluate the following limits:

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

2. $\lim_{h \to 0} \dfrac{\sqrt{a+h} - \sqrt{a}}{h}$