MA 125 00, CALCULUS I
August 29, 2011

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

Student Signature: .....

TEST I

No calculators are allowed!

PART I

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

All problems in Part I are 6 points each.

Evaluate the following limits.

Question 1

$$\lim_{x\to 3} \frac{x^2+x-12}{x-3}$$

Answer: .....

Question 2

$$\lim_{x\to 0} \frac{\sin(5x)}{\sin(2x)}$$

Answer: .....

Question 3

$$\lim_{x\to\infty} \frac{-5x^3+4x-5}{x^6-5x^2}$$

Answer: .....

Question 4

$$\lim_{x\to 0} \cos(\ln(x^2+1))$$

Answer: .....

Question 5

$\lim_{x\to 0^-} \frac{x}{|x|}$. Note this is a left-sided limit.

Answer: .....

Question 6

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

Answer: .....

Question 7

$\lim_{x \to 0} \frac{\tan(x)}{2x} =$

Answer: .....

Question 8

$\lim_{h \to 0} \frac{\frac{1}{3+h} - \frac{1}{3}}{h}$

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$(5.01)^2 = 25.1001$. If the position of a particle at time t is given by $S(t) = t^2$ (meters; time in seconds), find:

1. the average velocity $\overline{v}_{5,\ 5.1}$

2. the average velocity $\overline{v}_{5,\ 5.01}$

3. Using a limit argument, obtain the instantaneous velocity $v(5)$. You must explain your answer!!

Problem 3 (16 points)

Evaluate the following limits:

1. $\lim_{x \to 0} \dfrac{1 + \cos(x)}{|x|}$

2. $\lim_{x \to 0} \dfrac{1 - \cos(x)}{x}$