MA 125-6B, CALCULUS I
August 29, 2012

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 work for full credit!

All problems in Part I are 6 points each.

Evaluate the following limits.

Question 1

$$\lim_{x\to 1} \frac{x^2+x-2}{x-1}$$

Answer: .....

Question 2

$$\lim_{x\to 0} \frac{\tan(8x)}{2x}$$

Answer: .....

Question 3

$$\lim_{x\to\infty} \frac{1+4x^3}{1000+300x^2+2x^3}$$

Answer: .....

Question 4

$$\lim_{x\to 2} \sqrt{\cos(5-x^2)}$$

Answer: .....

Question 5

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

Answer: .....

Question 6

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

(Note: this is a left-sided limit!)

Answer: .....

Question 7

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

Answer: .....

Question 8

$$\lim_{h\to 0} \frac{(3+h)^2-9}{h}$$

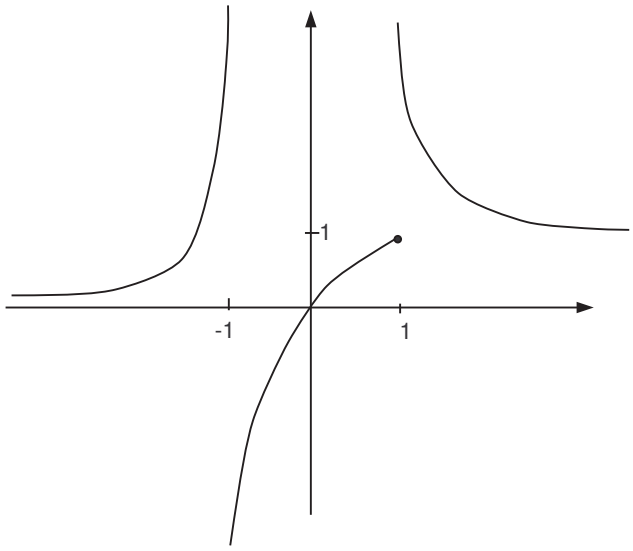
Answer: .....

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:



2pts $\lim_{x \to -1^-} f(x) =$

2pts $\lim_{x \to -1^+} f(x) =$

2pts $\lim_{x \to -1} f(x) =$

2pts $\lim_{x \to 1^-} f(x) =$

2pts $\lim_{x \to 1^+} f(x) =$

2pts $\lim_{x \to 1} f(x) =$

2pts $\lim_{x \to \infty} f(x) =$

2pts $\lim_{x \to -\infty} f(x) =$

2pts State all intervals on which $f(x)$ is continuous.

Problem 2 (18 points)

Note that $5^3 = 125$, $(5.1)^3 = 132.651$ and $(5.01)^3 = 125.751501$ and $(5.001)^3 = 125.075015001$. If the position of a moving object at time t is given by $S(t) = t^2$ (meters; time in seconds), find the average velocity for the time period beginning when $t = 1$ and lasting

1. 0.1 second (note that $1.1^2 = 1.21$)

2. 0.01 second (note that $1.01^2 = 1.0201$)

3. 0.001 second (note that $1.001^2 = 1.002001$)

4. Estimate (guess) the instantaneous velocity when $t = 1$.

Problem 3 (16 points)

(8 pts) Evaluate the following limit. Show your work.

$$\lim_{x\to\infty}\left(x-\sqrt{x^2+10}\right)$$

(8 pts) Show that there is a root of the equation $\cos(x)-x=0$ between 0 and $\pi/2$.