

MA 125 6C, CALCULUS I

September 9, 2009

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

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

Answer: 1

Question 2

$$\lim_{x \rightarrow 0} \frac{\sin(8x)}{2x}$$

Answer: 4

Question 3

$$\lim_{x \rightarrow \infty} \frac{2 - x^3 + 10x}{100 + 3x^3}$$

Answer: $-1/3$

Question 4

$$\lim_{x \rightarrow \pi} \sqrt{9 + [\sin(x)]^2}$$

Answer: 3

Question 5

$$\lim_{x \rightarrow 0} \frac{-2}{x^2}.$$

Answer: $-\infty$ (or DNE)

Question 6

$$\lim_{x \rightarrow \infty} \cos x$$

Answer: DNE

Question 7

$$\lim_{x \rightarrow \infty} \frac{\cos(x^2)}{x} =$$

Answer: 0

Question 8

$$\lim_{h \rightarrow 0} \frac{(4 - h)^2 - 16}{h}$$

Answer: -8

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. $\lim_{x \rightarrow -1^-} f(x) = 2$
2. $\lim_{x \rightarrow -1^+} f(x) = -1$
3. $\lim_{x \rightarrow 1} f(x) = \text{DNE}$
4. $\lim_{x \rightarrow 2^-} f(x) = 1$
5. $\lim_{x \rightarrow 2^+} f(x) = 1$
6. $\lim_{x \rightarrow 2} f(x) = 1$
7. $\lim_{x \rightarrow \infty} f(x) = 2$
8. State all intervals on which $f(x)$ is continuous.
Answer: $(-\infty, 1) \cup (1, 2) \cup (2, +\infty)$.

Problem 2 (18 points)

If the position of a particle at time t is given by $S(t) = t^2$, find:

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

Answer: 6.1

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

Answer: 6.01

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

Answer: 6

Note: $3.1^2 = 9.61$ and $3.01^2 = 9.0601$.

Problem 3 (16 points)

Evaluate the following limits:

1. $\lim_{h \rightarrow 0} \frac{\sqrt{9+h} - 3}{h}$

Answer: $1/6$

2. $\lim_{x \rightarrow \infty} x - \sqrt{x^2 - x - 1}$

Answer: $1/2$