MA 125 - 6D, CALCULUS I

February 5, 2014

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

Student Signature: .....

TEST I

No calculators are allowed!

PART I

Part I consists of 12 questions. Clearly write your answer (only) in the space provided after each question. You do not need not to show your work for this part of the test. No partial credit is awarded for this part of the test!

Each question is worth 6 points.

Question 1

Find the limit

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

Answer: .....

Question 2

Find the limit

$$\lim_{x\to 1} \frac{(x+2)^2-9}{x-1}.$$

Answer: .....

Question 3

Evaluate

$$\lim_{x\to 0} \cos\left(x + \sin x\right).$$

Answer: .....

Question 4

Find the limit

$$\lim_{x\to 0} \frac{\sqrt{x+1}-1}{x}.$$

Answer: .....

Question 5

Evaluate the limit

$$\lim_{x\to \infty} \frac{x - x^3}{2x^3 - x^2 + 1}.$$

Answer: .....

Question 6

Find the limit $\lim_{x\to 0^-} \dfrac{x-1}{x}$. Note this is a left-sided limit.

Answer: .....

Question 7

Find the limit $\lim_{x\to 0} \dfrac{\sin(2x)}{\sin(7x)}$.

Answer: .....

Question 8

Calculate the derivative of the function $f(x) = x^2 \sin(x)$.

Answer: .....

Question 9

Calculate the derivative of the function $f(x) = \frac{\cos(x)}{x}$.

Answer: .....

Question 10

Calculate the derivative of the function $f(x) = \tan(x^3)$.

Answer: .....

Question 11

Calculate the derivative of the function $f(x) = \sqrt{x}\cot(x)$.

Answer: .....

Question 12

Calculate the derivative of the function

$$f(x) = \frac{1}{x} - \frac{1}{x^{1/3}}.$$

Answer: .....

PART II

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

Each problem is worth 10 points.

Problem 1

Consider the function

$$f(x) = \begin{cases} 2x - 1 & \text{for } x < 2, \\ 2 + x^2 & \text{for } x \geq 2. \end{cases}$$

(a) Evaluate

$$\lim_{x \to 2^-} f(x).$$

(b) Evaluate

$$\lim_{x \to 2^+} f(x).$$

(c) Is this function continuous at $x = 2$?

Problem 2

(a) Find horizontal and vertical asymptotes of the function

$$f(x) = \frac{-x^2 - x + 2}{x^2 - x}$$

(b) Find

$$\lim_{x \to 0^+} f(x).$$

Problem 3

(a) Using implicit differentiation find the derivative y' if $x + x^2y^2 + x\sin(y) = 1$.

(b) Using the result of the previous question find the equation of the tangent line at point $(1, 0)$.