MA 125 - 6C,   CALCULUS I

February 25, 2013

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

 Student Signature: . . . .

$\boxed{\boxed{\text{TEST II}}}$

$\boxed{\text{No calculators are allowed!}}$

$\boxed{\text{PART I}}$

Part I consists of 10 questions. Clearly write your answer in the space provided after each question. Show your work as much as possible.

Each question in Part I is worth 5 points.

Question 1

Differentiate the function $y = f(x) = (x + 6)(x - 11)$. (Simplify your answer!)

Answer: . . . .

Question 2

Differentiate the function $y = f(x) = \frac{x^6 - x^2}{x^2 - 1}$. (Simplify your answer!)

Answer: . . . .

Question 3

Find $f'(x)$ if $y = f(x) = x^4 \sec(x)$.

Answer: ....

Question 4

Differentiate the function $y = f(x) = \frac{x^5+1}{x^5-1}$. **Simplify your answer!**

Answer: ....

Question 5

Differentiate the function $y = f(x) = \csc(x^4 - 1)$.

Answer: ....

Question 6

Find $y' = \frac{dy}{dx}$ if $x^5 + y^5 + 3xy = 0$.

Answer: ....

Question 7

If $A = 4\pi r^2$ is the surface area a round sphere of radius r. Find $\frac{dA}{dt}$ when $r = 10$ and $\frac{dr}{dt} = -3$.

Answer: ....

Question 8

Find all values x in the domain of the function $y = f(x) = (x^2 - 4)^8$ where the tangent line at the point $(x, f(x))$ is horizontal.

Answer: ....

Question 9

Differentiate the function $y = \sqrt[5]{x^4 - x^2 + 4x}$.

Answer: ....

Question 10

If $s(t) = t\cos(t^2)$ is the position of a particle at time t, find the velocity at time $t = \sqrt{\pi}$.

Answer: ....

PART II

Each problem is worth 10 points.

Part II consists of 5 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.

Problem 1

Find the equation of the tangent line to the graph of the function $y = f(x) = 5x \cos(x + \pi)$ at the point with $x = 0$.

Problem 2

Find $y' = \frac{dy}{dx}$ if $x^4 + xy + y^4 = \sin(xy)$.

Problem 3

Find all x-coordinates of points on the graph of $f(x) = (3x+2)^{100}(x-3)^{50}$ where the tangent line is horizontal. [Hint: factor the derivative.]

Problem 4

The car A is heading straight North from Las Vegas at the speed of 60 mi/h, whereas car B is heading straight from the East of Las Vegas toward that city at the speed of 40 mi/h. At what rate is the distance between the two cars changing when both of them are 50 miles away from the city?

Problem 5

A large pyramidal tank (in the shape of an Egyptian pyramid) has height 24m and a base square with edge length 8m. If oil is added to the tank at the rate of 2 m^3/hr, how fast is the level of oil in the tank rising when it is 12m high?

The volume V of such a pyramid with base edge length a and height h is $\frac{1}{3}a^2h$.