MA 125 - CT, CALCULUS I

Aprill 22, 2010

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

Student Signature: .....

TEST IV

No calculators are allowed!

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 and simplify your answer when possible

Each question is worth 5 points.

Question 1

Find the critical numbers of the function $y = f(x) = x^3 + x^2$.

Answer: .....

Question 2

State on which intervals the function $y = f(x) = x^3 - 3x$ is increasing and decreasing.

Answer: .....

Question 3

Find the point(s) of inflection of the function $y = x^3$

Answer: .....

Question 4

Find the absolute maximum of the function $y = f(x) = x^2 + 2$ on the interval $[-1, 2]$. State both x and y-coordinates of the maximum.

Answer: .....

Question 5

Find the antiderivative of $y = f(x) = x(x^3 + x)$

Answer: .....

Question 6

If $f'(x) = (x+1)^2(x-3)$, find where $f(x)$ is concave up or down. **Note that you are given $\mathbf{f'(x)}$!**

Answer: .....

Question 7

If $a(t) = 2t$, $v(0) = 2$ and $s(0) = 1$, find $S(t)$

Answer: .....

Question 8

Find all asymptotes of the function $y = \frac{4x^3-4}{x(x-1)(x+2)}$.

Answer: .....

Question 9

Find the general antiderivative of $y = f(x) = \cos(x) + \frac{1}{x}$.

Answer: .....

Question 10

Find two positive numbers whose product is 4 and whose sum is minimal.

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. Simplify when possible.

Problem 1; 10 points

Find the absolute maximum and minimum of the function $y = f(x) = (x^2 - 1)^2$ on the interval $[0, 2]$.

Problem 2; 20 points

If $y = f(x) = \frac{x^2-4}{x^2-9}$, find
(a) x and y intercepts.

(b) Vertical and horizontal asymptotes.

(c) Critical points and local/absolute max/min

(d) Points of inflection and where f is concave up/down

(e) graph the function

Problem 3; 10 points

Find the dimensions of a rectangle in the upper half plane (above the x-axis) with two vertices on the x-axis and the other two vertices on the circle $x^2 + y^2 = 1$.