

MA 125 CALCULUS I

Sept 21, 2011

Name (Print last name first):

Student Signature:

No calculators are allowed!

Part I consists of 8 questions (6 pts each). Show your work on any question that says SHOW WORK.

(1)

Differentiate $y = f(x) = (x^2 + 3)(x^2 + 1)$. (Simplify answer!)

Answer:

(2)

Use the power rule (NOT quotient rule) to find $\frac{dy}{dx}$ if $y = \frac{x^6 - x^2}{x^2}$ (**SHOW WORK**)

Answer:

(3)

Find $f'(x)$ if $y = f(x) = x^2 \cos(x)$.

Answer:

(4)

Use the quotient rule to find y' if $y = f(x) = \frac{x^2+1}{x^2-1}$. **(SHOW WORK)**

Answer:

(5)

Differentiate the function $y = f(x) = \tan(x^3)$.

Answer:

(6)

Use implicit differentiation to find $y' = \frac{dy}{dx}$ if $x^4 + y^4 = 5$.

Answer:

(7)

Differentiate the function $y = (3x^2 + x + 1)^5$ **(NO NEED TO SIMPLIFY)**

Answer:

(8)

If $y = f(x) = (x^3 + 1)^2$ is the position of a particle at time x , find the velocity y' at time $x = 1$.

Answer:

Part II consists of 4 problems (13 pts each). 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 credit.

You do not need to simplify final answers in Part II.

Problem 1

Find the equation of the tangent line to the graph of the function $y = f(x) = (x - 2)^3x^4$ at the point with $x = 1$.

Problem 2

Find y' if $x^3 + y^3 = xy$.

Problem 3

Use the quotient rule to show that the derivative of $\tan(x)$ is $\sec^2(x)$. Hint: use $\tan(x) = \frac{\sin(x)}{\cos(x)}$ and $\sec(x) = \frac{1}{\cos(x)}$. You may use the derivatives of $\sin(x)$ and $\cos(x)$ from memory.

Problem 4

A 5-foot ladder is slipping down a wall. Suppose the top of the ladder is 4 feet from the ground and is slipping down at 2 ft/sec. How fast is the base of the ladder moving away from the wall? DON'T FORGET UNITS!