

10/10/2001
Dr. Lunsford

MA303 Calculus I
Test 2

Name: _____
(100 Points Total)

Neatly show all of your work. Clearly indicate your answers. Good Luck!

I. Use the definition of the derivative function to find the derivative of

$$f(x) = 3 - 4x - x^2. \text{ (8 points)}$$

II. Basic Derivatives. Find the indicated derivatives. (4 points each – 16 points total)

1. $y = \cos 8x$

$$\frac{dy}{dx} =$$

2. $z = \sqrt[4]{x^5}$

$$\frac{dz}{dx} =$$

3. $f(t) = (7 - t)^3$

$$f'(t) =$$

4. $w = \frac{1}{4 - \theta}$

$$\frac{dw}{d\theta} =$$

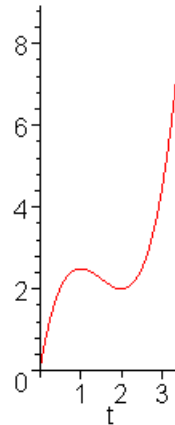
III. A particle moves along the y axis. Its position function is given

by $p(t) = t^3 - \frac{9}{2}t^2 + 6t$ where t is in seconds and $p(t)$ is in inches. Please answer

the following questions. Neatly show all of your work below. Clearly indicate your answers. (5 points each – 20 total)

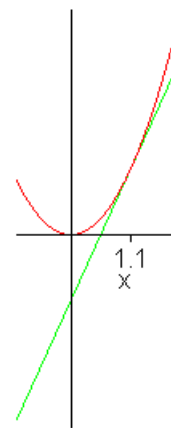
- (a) Find the average velocity of the particle from time $t = 1$ to $t = 3$ seconds. Draw the line on the graph below whose slope represents this velocity.
- (b) Find the velocity of the particle at $t = 1.5$ seconds. Draw the line on the graph below whose slope represents this velocity.
- (c) At what times (if any) is the velocity of the particle zero?
- (d) Find the acceleration of the particle at time $t = 2$ seconds.

Graph for Problem III



IV. The line l is tangent to the graph of $y = x^2$ at $x = 1.1$. Find the y intercept of the line. Indicate the intercept on the graph below. (8 points)

Graph for Problem IV



V. Find the indicated derivatives. DO NOT simplify your answers. (8 points each – 32 total)

1. $f(x) = \frac{x^3 \tan 2x}{x^2 + 1}$

$D_x f(x) =$

2. $w = \sqrt[5]{x^2} \sec 5x$

$\frac{dw}{dx} =$

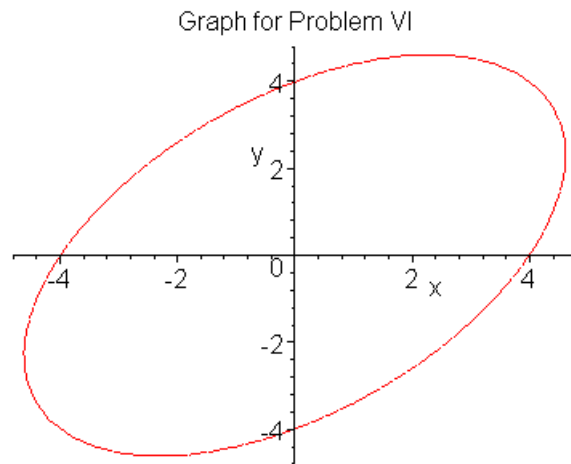
3. $g(x) = (x^3 - 7x^2 + 11)^5 (3x^4 - 8x + 2)^{-7}$

$g'(x) =$

4. $y = \sin^4(x^3 - 11x + 5)$

$\frac{dy}{dx} =$

VI. Below you are given the graph of $x^2 - xy + y^2 = 16$. Find the slope of the tangent line to the graph at the point $(x, y) = (-4, 0)$. Draw the tangent line on the graph below. (8 points)



VII. An airplane flies at an altitude of 5 miles toward a point directly over an observer (see figure). The speed of the plane is 500 miles per hour. Find the rate of change of the distance between the observer and the plane when the distance between the observer and the plane is 10 miles. (8 points)