

Math 142
Spring, 2004
Exam 1
Chapters 1 and §2.1 - 2.6, P.1, P.2, P.3, P.5, and P.6

Name: _____

Please write your name only on this page of the exam.

Show all work to receive credit.

Please leave all answers in exact value (i.e. no decimal approximations).

Page	Points Possible	Points Earned
2	12	
3	18	
4	14	
5	16	
6	18	
7	20	
Total	100	

Part I - Definitions and Theorems State the requested definition or theorem. (3 points each)

1. A function is:
2. $f(x)$ is continuous at $x = a$ if:
3. The derivative of $f(x)$ at $x = a$ is:
4. State the Intermediate Value Theorem:

Part II - Calculations

Show all work to receive credit. NO WORK = NO CREDIT.

5. Compute the following limits:

(a) (6 points) $\lim_{x \rightarrow 2^-} \frac{|x - 2|}{x - 2}$

(b) (6 points) $\lim_{x \rightarrow 0} \frac{\sin 3x}{5x}$

(c) (6 points) $\lim_{x \rightarrow \infty} \frac{x^2 + 3x + 2}{\sqrt{x^2 + 9}}$

6. (8 points) Use the **definition of derivative** to find the derivative of $f(x) = \frac{1}{x^2}$

7. Compute the following derivatives:

(a) (6 points) $\frac{d}{dx} \left(x^3 + \frac{3}{x} + \tan x + \sin x - 3 \cos(4x) + x^\pi \right)$

(b) (8 points) $\frac{d}{dx} \left(\frac{\sec x}{3x^2 + 5} \right)$

- (c) (8 points) (Not sure we'll get to this)

Find $\frac{dy}{dx}$ for the parametric equations $x(t) = 3 \cos \sqrt{t}$, $y(t) = 3 \tan \left(\frac{1}{t} \right)$

(d) (6 points) $\frac{d}{dx} (\sec(\sin(3x)))$

(e) (6 points) $\frac{d}{dx} ((\cot x)(3x^2 + 5))$

- (f) (6 points)

Part III - Applications Show all work to receive credit. NO WORK = NO CREDIT.

8. (8 points) Find the equation of the tangent line to $y = 3x \sin x$ at $x = \frac{\pi}{6}$
9. (12 points) The position function for a particle is given by $s(t) = t^2 - 3t - 9$. What is the velocity of the particle when it is 6 meters from where it started?