EXAM 2 - MATH 151

DATE: Friday, March 28

INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 20 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

NAME:_____

Section:_____

	Score
Problem 1	
Problem 2	
Problem 3	
Problem 4	
Problem 5	
TOTAL	

1. (a) Use the **limit definition of the derivative** to compute $f'(3)$ if $f(x) = \frac{1}{x}$. (10 points)

   (b) Consider the function

   $$f(x) = \begin{cases} x + 2, & \text{if } x < 1 \\ 1, & \text{if } x = 1 \\ -x^2 + 2x + 2, & \text{if } x > 1 \end{cases}$$

   Find $\lim_{x \to 1} f(x)$. (5 points) Is f continuous at $x = 1$? Explain. (5 points)

2. Compute the following limits:

   (a) $\lim_{x \to -5} \frac{x^2 + 4x - 5}{3x^2 + 16x + 5}$ (10 points)

   (b) $\lim_{x \to 2^-} \frac{x-5}{x-2}$. (10 points)

3. Compute the derivatives of the following functions:

   (a) $f(x) = 5x^7 - 3x^3 + 9x^2 - 10$ (10 points)

   (b) $f(x) = (x^3 - x + 1)(x^2 + 5)^5$ (10 points)

4. Consider the function $f(x) = \left(\frac{x+1}{3-x}\right)^2$.

   (a) Find $f'(x)$. (10 points)

   (b) Find the slope of the tangent line to the graph of $y = f(x)$ at $x = 2$. (4 points)

   (c) Find an equation of the tangent line to the graph of $y = f(x)$ at $x = 2$. (6 points)

5. Suppose that the revenue function R in terms of the number of units x produced and sold of a certain commodity is given by $R(x) = -\frac{1}{3}x^3 + 50x^2 + 500$.

   (a) Find the marginal revenue. (10 points)

   (b) Which quantity x should be produced to maximize the marginal revenue? (5 points)

   (c) What is the maximum marginal revenue? (5 points)