

**MATH 234 AL1 FIRST EXAM**

THURSDAY, SEPTEMBER 20TH, 2007, 9AM

Name: \_\_\_\_\_ Section: \_\_\_\_\_

**Show all work for full credit. No calculators are allowed.**

Problem	Score
1	
2	
3	
4	
5	
6	
Total	of 75

**Problem 1** (10 pts). Find the equation of the tangent line at the point  $(1, 404)$  of the function

$$y = x^3 + 3x + 400.$$

**Problem 2** (5 pts each). Compute the derivatives of the following functions.

(1)  $f(x) = 4\sqrt{x} - \frac{3}{x^2}$

(2)  $f(x) = \frac{3x - 5}{2x^2 + 1}$

(3)  $h(x) = (x^2 + 1)(x^2 - 1)$

**Problem 3** (5 pts each). Compute the following limits.

$$(1) \lim_{x \rightarrow \infty} \frac{2 - x^3}{3x^3 + 8x^2 + 1}$$

$$(2) \lim_{x \rightarrow 0^+} \frac{|x|}{x}$$

$$(3) \lim_{x \rightarrow -1^-} \frac{6}{x + 1}$$

**Problem 4** (5 pts each). Consider the function

$$h(x) = \begin{cases} 1 - 3x & \text{if } x < 4 \\ Ax^2 + 2x - 3 & \text{if } x \geq 4 \end{cases}$$

(1) What kind of discontinuity does  $h$  (potentially) have at  $x = 4$ ?

(2) Find the value(s) of  $A$  that make  $h$  continuous at  $x = 4$ .

**Problem 5** (5 pts each). Let the cost function of producing a particular commodity be  $C(x) = \frac{9x + 50}{x + 4}$  and suppose that the market demand for the commodity is  $D(x) = 20 - x$  ( $x$  in thousands).

(1) Find the break-even levels of production.

(2) What is the percentage rate of change of the demand at the production level  $x = 15$ ?

**Problem 6** (8, 2, and 5 pts). Let the supply and demand functions for a particular commodity in some economy be given by  $S(p) = 800p + p^3$  and  $q = D(p) = 200 - p^2$ .

(1) Calculate the price elasticity of demand function  $E(p)$ .

(2) When the price is  $p = 10$ , is the demand elastic, inelastic, or unitary?

(3) If the price is increased by a small amount from  $p = 10$ , what is the effect on revenue?