

MATH 234 AL1 FIRST EXAM

THURSDAY, SEPTEMBER 20TH, 2007, 8AM

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 $(1, 2)$ of the function

$$y = \frac{2}{x^3}.$$

Problem 2 (5 pts each). Determine if the following functions are continuous. If not, identify and classify the discontinuities as *removable*, *jump*, or *infinite*.

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

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

Problem 3 (5 pts each). Let the cost function of producing a particular commodity be $C(x) = 3x + 150$ and suppose that the market demand for the commodity is $D(x) = -10x + 250$ (x in thousands).

- (1) What is the percentage rate of change of the demand at the production level $x = 5$?

- (2) Find the profit function $P(x)$ and the profit or loss obtained when $x = 1$ units of the commodity are produced and sold.

Problem 4 (5 pts each). Compute the following limits.

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

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

$$(3) \lim_{x \rightarrow -\infty} \frac{1}{x - 1}$$

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

(1) $f(x) = x^4 + 6\sqrt{x}$

(2) $g(x) = \frac{2x + 1}{4x^2 - 7}$

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

Problem 6 (5, 8, and 2 pts). Let the supply and demand functions for a particular commodity in some economy be given by $S(p) = 3p+15$ and $q = D(p) = 6+9p-p^2$.

(1) Find the market equilibrium price.

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

(3) When the price is $p = 3$, is the demand elastic, inelastic, or unitary?