

NAME: _____

Student ID #: _____

QUIZ SECTION: _____

Math 111 A
Midterm II
November 19, 2009

Problem 1	15	
Problem 2	20	
Problem 3	15	
Total:	50	

- Your exam should contain **3 pages in total and 3 problems**. Please check your test for completeness.
- You must use the methods of this class to solve the problems, **and you must show entirely how you get your answers**. Work done “in your head” cannot get credit. Work done by guessing and checking, or by reading off values on a graphing calculator may get little credit. Correct answers with incomplete, wrong or missing work will get partial credit at best.
- Write your final answer in the indicated spaces. Unless otherwise specified, you may round off your final answer to the nearest two decimal digits.
- If you need more room, use the backs of pages and indicate to the reader that you have done so.
- Read each question carefully.
- Raise your hand if you have a question.

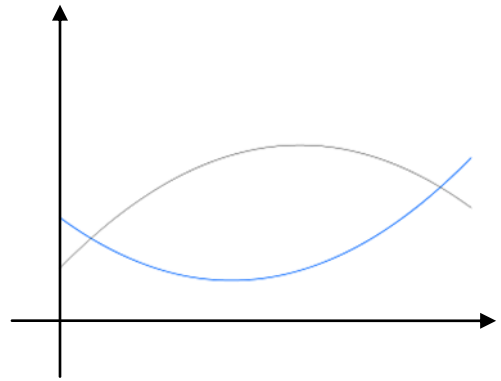
GOOD LUCK!

1. (15 points) The graphs to the right are parabolas, with the following formulas:

$$f(x) = x^2 - 5x + 15$$

$$g(x) = -x^2 + 6x + 10$$

- a) Find the values of x at which the two graphs cross.



ANSWER: at $x =$ _____ and at $x =$ _____

- b) Find the longest interval over which both functions are increasing. Fully justify your answer.

ANSWER: From $x =$ _____ to $x =$ _____

- c) Find the value of x at which $\frac{f(x)-f(0)}{x} = 7$

ANSWER: at $x =$ _____

2.

2. (20 pts) You produce and sell Cans of Cat Food, in order sizes of 1 to 150 Cans.

Each Can costs \$1.50 to produce. Your fixed costs are \$30.

To encourage larger orders, you offer a volume discount as follows: the price for an order of **one** Can is \$2.99, and you **decrease** the price per Can **by 1 cent** for each additional Can ordered. For instance, if a customer buys 5 Cans, the selling price is \$2.95 per Can.

a) (3 pts) Write down a linear formula, in terms of quantity q ordered, for the selling price per Can.

$$p(q) = \underline{\hspace{10cm}}$$

b) (4 pts) Write down formulas in terms of q for the Total Revenue and the Total Cost for an order of q Cans.

$$TR(q) = \underline{\hspace{10cm}}$$

$$TC(q) = \underline{\hspace{10cm}}$$

Note: To answer the following questions you need the TR function from part (b). If you could not answer part (b), circle and use the formula $TR(q) = 5q - 0.02q^2$ instead (this is not the correct answer in part b!)

c) (5 pts) Compute the formula in terms of q for the Marginal Revenue. Show all steps & simplify your answer.

$$\text{ANSWER: } MR(q) = \underline{\hspace{10cm}}$$

d) (6 points) Compute the largest profit possible.

$$\text{ANSWER: Max profit is } \underline{\hspace{10cm}} \text{ dollars}$$

3. (15 pts) The marginal revenue and marginal cost at q Items are given by the following linear functions:

$$MR(q) = -0.5q + b \quad \text{dollars}$$

$$MC(q) = 0.4q + 7 \quad \text{dollars}$$

In addition, the average cost (in dollars per Item) is given by the function:

$$AC(q) = 0.2q + 6.8 + \frac{38}{q}$$

a) What is the change in total cost if q increases from 4 to 5 Items?

ANSWER: _____ dollars

b) Recall that $MR(q) = -0.5q + b$. Compute a value of b that results in the profit being maximal at $q = 10$ Items.

ANSWER: $b =$ _____

c) Compute the breakeven price.

ANSWER: BEP = _____ dollars per item.