

NAME: \_\_\_\_\_

Student ID #: \_\_\_\_\_

QUIZ SECTION: \_\_\_\_\_

**Math 111 D**  
**Midterm II**  
November 9th, 2006

Problem 1	20	
Problem 2	20	
Problem 3	10	
<b>Total:</b>	<b>50</b>	

- You may use a calculator, a ruler, and one sheet of notes.
- Your exam should contain 4 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 units and in the indicated spaces.**
- If you need more room, use the backs of pages and indicate to the reader that you have done so. If you still need more paper, ask your TA for some more, write your name and section on it and make sure you turn it in to your TA inside your test.
- Read each question carefully. Raise your hand if you have a question.

GOOD LUCK!

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*Do you want me to post your grade so far on the class website under the last 4 digits of your Student Number?*

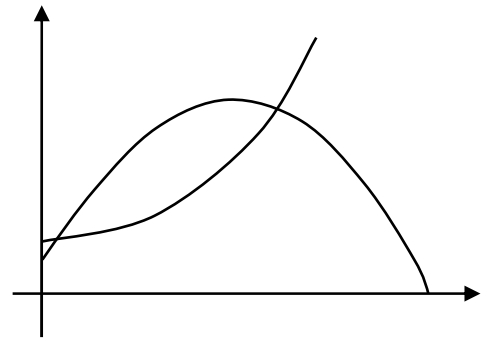
*Yes, please post my grade. Sign to give permission: \_\_\_\_\_*

*No, please don't post my grade so far.*

1 (20 points) You have two bank accounts: a checking account and a savings account. The balances of these accounts (in thousands of dollars) after  $t$  days are given by:

$$\text{Checking: } C(t) = -t^2 + 24t + 10$$

$$\text{Savings: } S(t) = 0.3t^2 + 0.2t + 13$$



a) When will the balance of your checking account be \$0?

Answer: After  $t =$  \_\_\_\_\_ days

b) Let  $A(t)$  be the total amount of money you have in both accounts combined. When will  $A(t)$  be largest?

Answer: After  $t =$  \_\_\_\_\_ days

c) What is the average rate of change in the balance of your savings account from  $t=2$  days to  $t=10$  days?

Answer: \_\_\_\_\_ Units: \_\_\_\_\_

d) You open another savings account whose balance after  $t$  days is denoted  $N(t)$ . The balance of this new account is always the same as the amount that was in the original savings account ten days before. Find a formula for  $N(t)$ . Simplify until your formula is in the form  $N(t) = at^2 + bt + c$ .

Answer:  $N(t) =$  \_\_\_\_\_

2 (20 points) You produce and sell bottles of Zap Energy Drink. If you sell  $q$  **hundred** bottles, your price per bottle is given by the function:

$$p(q) = 4 - 0.2q \text{ (in dollars per bottle)}$$

Your average cost for producing  $q$  **hundred** bottles of is

$$AC(q) = 0.07q + 1.3 + \frac{4}{q} \text{ (in dollars per bottle)}$$

*Caution: In this problem, please pay attention to units!*

- a) Write the formulas, in terms of  $q$ , for the Total Revenue, Total Cost and Profit functions. No explanation is needed, but simplify your formulas and include units.

Answer: TR( $q$ ) = \_\_\_\_\_ Units: \_\_\_\_\_

TC( $q$ )= \_\_\_\_\_ Units: \_\_\_\_\_

Profit( $q$ )= \_\_\_\_\_ Units: \_\_\_\_\_

- b) What are all the possible quantities of bottles you can sell in order to make a (positive) profit?

Answer: \_\_\_\_\_ bottles.

- c) What is the maximal value of your Total Revenue, and how many bottles do you have to sell in order to achieve it?

Answer: The maximal value of TR is \_\_\_\_\_ dollars, and it occurs at \_\_\_\_\_ bottles.

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d) Find the marginal revenue at  $q=1$  **hundred** bottles.

Answer:  $MR(1)=$ \_\_\_\_\_.

3 (10 points) You produce and sell Gizmos. Your marginal revenue and marginal cost at  $q$  Gizmos are given by the formulas:

$$MC(q) = 2 + 0.6q, \quad MR(q) = 5 - 0.3q$$

Your total cost, in dollars, is given by the formula  $TC(q) = 0.3q^2 + 2q + 30$ .

a) For what number of Gizmos will your profit be maximal?

Answer: *For*  $q=$  \_\_\_\_\_ Gizmos  
(note: your answer should be a whole number)

b) Compute the Breakeven Price.

Answer:  $BEP=\$$  \_\_\_\_\_.