

NAME: _____

Student ID #: _____

QUIZ SECTION: _____

Math 111
Midterm II
November 8th, 2007

Problem 1	11	
Problem 2	15	
Problem 3	15	
Problem 4	9	
Total:	50	

- Your exam should contain **4 problems on 4 pages**. 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.
- 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. Do not get stuck on any one question for too long.
- Raise your hand if you have a question.

GOOD LUCK!

Do you want me to post your grades 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.

(Grades will be posted a week or more after the exam.)

1. (11 pts=2+4+5) Two cars, an Audi and a Bug, start at the same place and drive in the same direction on a straight road. The **distance** covered by the **Audi** in the first t minutes is given by:

$$D_A(t) = 0.75t \text{ (in miles)}$$

The **average trip speed (ATS) of the Bug** during the first t minutes is given by the function:

$$s_B(t) = 0.08t + 0.2 \text{ (in miles per minute)}$$

- a) Find the formula, in terms of t , for the distance covered by the Bug in the first t minutes.

Answer: $D_B(t) = \underline{\hspace{10em}}$.

- b) At $t = 2$ minutes, which car is ahead, and by how many miles?

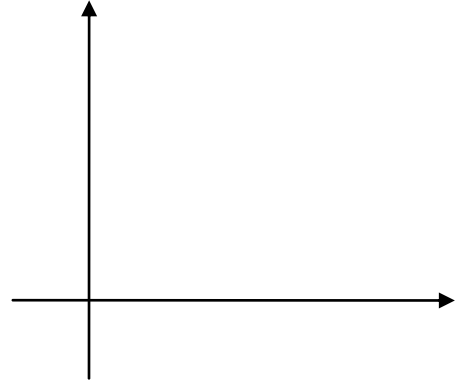
Answer: Car is ahead of Car by miles .

- c) When is the Bug exactly 1 mile ahead of the Audi?

Answer: The Bug is 1 mile ahead of the Audi at $t = \underline{\hspace{10em}}$ minutes.

2. (15 pts=6+3+6) Water is flowing in and out of a vat. The formula for the amount of water in the vat, at t hours, is: $A(t) = 0.5t^2 - 6t + 20$ gallons.

a) Sketch the graph of $A(t)$ and find all the times when the vat contains **at most** 10 gallons of water.



Answer: Vat A contains ≤ 10 gallons at times: _____.
(your answer should be one or more time intervals)

b) Another vat, vat B, contains 10 gallons of water initially. Water is added to vat B at a constant rate of 5 gallons an hour. Find a formula (in terms of t) for the amount of water in vat B at time t hours. (You don't need to show work.)

Answer: $B(t) =$ _____ gallons.

c) At what time is the **difference** between the amount of water in vat B and the amount of water in vat A the greatest?

Answer: At $t =$ _____ hours

3. (15 pts=3+6+6) You produce Blivets in batches of 1 to 60. Each Blivet costs you \$5 to produce, and your fixed costs are \$100.
Your total revenue from selling q Blivets is: $TR(q) = -0.3q^2 + 25q$ dollars.
- a) Find a formula for your Average Revenue from selling q Blivets. Simplify and specify the units for AR.

Answer: $AR(q) =$ _____ Units: _____

- b) Recall that $MR(q) = TR(q + 1) - TR(q)$. Find a formula, in q , for the Marginal Revenue $MR(q)$. Simplify as much as possible.

Answer: $MR(q) =$ _____

- c) What number of Blivets maximizes your profit?

Answer: Profit will be maximal at $q =$ _____ Blivets (*answer should be a whole number*)

4. (9 pts=4+5) You are producing Items.
 Your **average cost** for producing q **hundred Items** is given by the function:

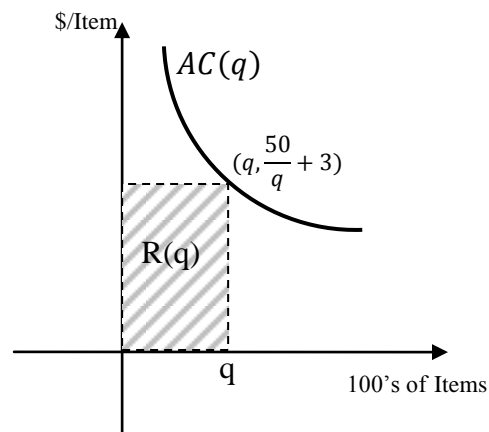
$$AC(q) = \frac{50}{q} + 3 \text{ (dollars per Item)}$$

- a) For what number of Items is your average cost \$7 per item?

Answer: For $q =$ _____ Items.

- b) Define a new function, $R(q)$, to be:
 the area of the rectangle under the graph of the average cost $AC(q)$,
 with a corner at the point $(q, \frac{50}{q} + 3)$, and sides along the axes.

Compute $R(50)$ and state what this area represents, in terms of your costs.
 Include correct units.



Answer: $R(50) =$ _____ Units: _____

This area represents: _____ for producing _____.