

NAME: _____

Student ID #: _____

QUIZ SECTION: _____

Math 112 B
Midterm I
February 5, 2008

Problem 1	5	
Problem 2	9	
Problem 3	12	
Problem 4	11	
Problem 5	13	
Total:	50	

- You are allowed to use a calculator, a ruler, and one sheet of notes.
- Your exam should contain 5 pages in total and 5 problems. Make sure you have a complete test.
- Unless otherwise instructed, you must show how you get your answers.
Correct (or incorrect) answers with no supporting work may result in little or no credit.
- If an algebraic method is available, answers obtained by guessing, approximating, or plug-and-check will get little or no credit.
- If you need more room, use the backs of pages and indicate to the reader that you have done so.
- Raise your hand if you have a question.

GOOD LUCK

Do you want me to post your grades so far on the class website under the last 4 digits of your STUDENT ID (in about a week)?

Yes, please post my grades. Sign to give permission: _____

No, please don't post my grades.

1. (5 points) Find $f'(x)$, if $f(x) = x\left(\sqrt{x} + \frac{7}{x^2}\right) - 8x + 1$.

Answer: $f'(x) =$ _____

2. (9 points) Let $A(t)$ represent the amount of water (in thousands of gallons) that flows into a reservoir in t hours. We are not told the formula for $A(t)$, but instead are told that:

$$\frac{A(m+h) - A(m)}{h} = 15 - 3m + h$$

(a) Compute the average rate of flow into the reservoir during the half-hour interval beginning at $t = 2$.

Answer: _____ thousand gallons per hour

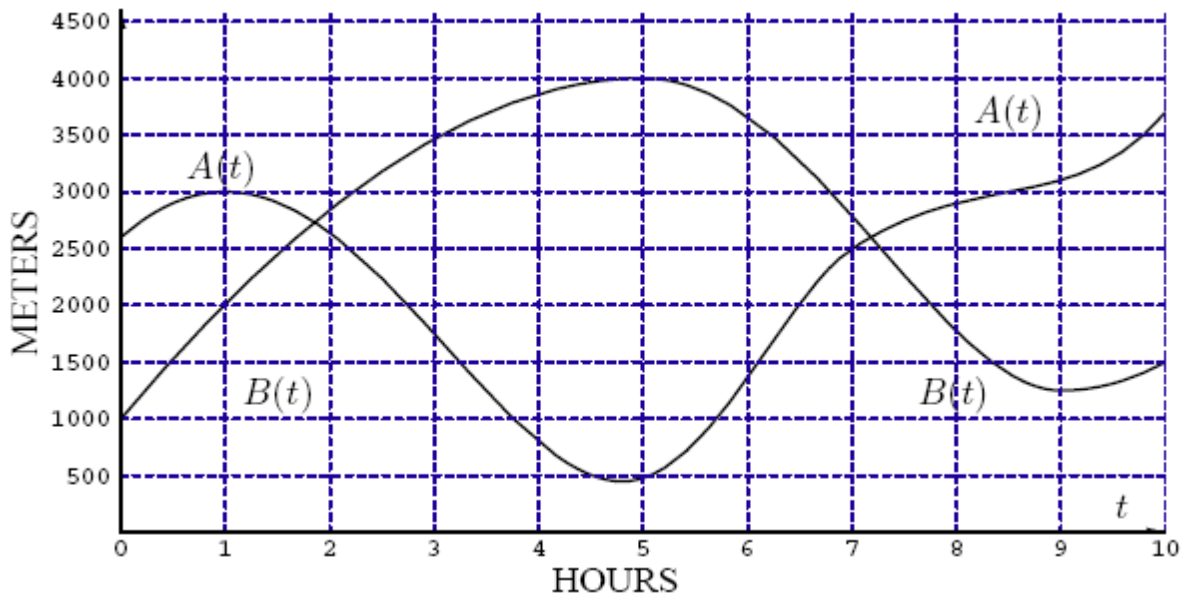
(b) Find a positive value of h so that $A(6+h) - A(6) = 10$.

Answer: $h =$ _____

(c) Compute the instantaneous rate of flow into the reservoir at $t = 3.12$ hours. Give correct units in your answer.

Answer: _____

3. (12 Points) The two graphs below are of altitude vs. time for two balloons, A(t) and B(t).



a) Find a time interval during which balloon A ascends (rises) at a speed greater than 500 meters per hour.

Answer: From $t =$ _____ to $t =$ _____ hours.

b) Find a time t such that $\frac{B(t+2)-B(t)}{2} = 200$.

Answer: At $t =$ _____ hours.

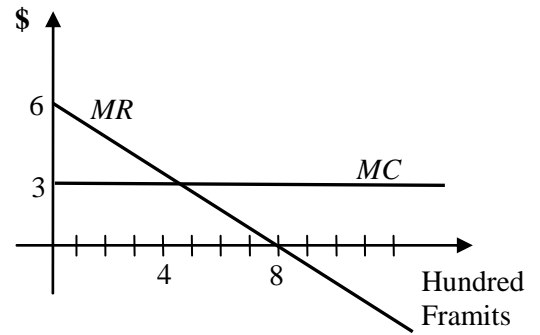
c) Estimate the speed of balloon A at $t = 4$ hours.

Answer: _____ meters per hours.

4. (11 points = 3+3+5)

You produce and sell Framits. The graphs to the right show your **Marginal Revenue and Marginal Cost** at q hundred Framits.

You need not show work in this problem.



- a) What quantity between $q=2$ and $q=4$ hundred Framits results in the largest profit?

Answer: $q =$ _____ hundred Framits.

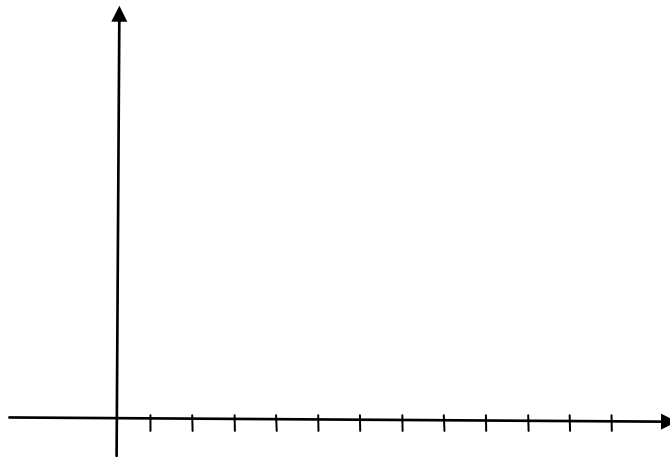
- b) What quantity between $q=2$ and $q=4$ hundred Framits results in the largest Total Revenue?

Answer: $q =$ _____ hundred Framits.

- c) Your Fixed Costs are $FC = \$100$. You may assume that $TR(0) = \$0$.

On the axes below, sketch the graphs of the Total Revenue and Total Cost.

Label the y-intercepts, and the x-coordinates of the highest or lowest point on the graphs.



5. (13 Points) The altitude $A(t)$ (in yards) versus time (in hours) for a weather balloon is given by the formula:

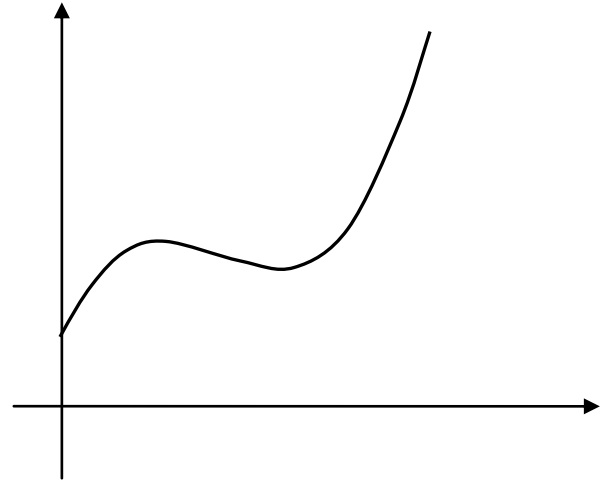
$$A(t) = t^3 - 13t^2 + 50t + 50.$$

A sketch of its graph is shown to the right.

a) Write down the formula for the derivative $A'(t)$

Answer: $A'(t) =$ _____

b) Find the longest time interval over which the balloon is descending.



Answer: The balloon is descending from $t =$ _____ to $t =$ _____ hours.

c) Find the lowest altitude the balloon reaches in the time interval $t=2$ to $t=8$ hours.

Answer: _____ yards.