

MATH 111
Exam II
November 9, 2006

Name _____

Student ID # _____

Section _____

HONOR STATEMENT

“I affirm that my work upholds the highest standards of honesty and academic integrity at the University of Washington, and that I have neither given nor received any unauthorized assistance on this exam.”

SIGNATURE: _____

1	13	
2	12	
3	12	
4	13	
Total	50	

- Please check that your exam contains 4 problems.
- Please turn your cell phone OFF and put it away for the duration of the exam.
- Unless otherwise indicated, you must show your work. Clearly label lines and points that you are using and show all calculations. The correct answer with no supporting work may result in no credit.
- If you use a guess-and-check method when an algebraic method is available, you may not receive full credit.
- Put your name on your sheet of notes and turn it in with the exam.

GOOD LUCK!

1. (13 points) You produce and sell Framits. The total cost (in **thousands** of dollars) for producing q **thousand** Framits is given by

$$TC(q) = q^2 + 9q + 10.$$

- (a) What is the change in total cost if you increase production from 4000 Framits to 4001 Framits? Include units.

ANSWER: _____

- (b) Find the average variable cost (AVC) for producing 10,000 Framits. Include units.

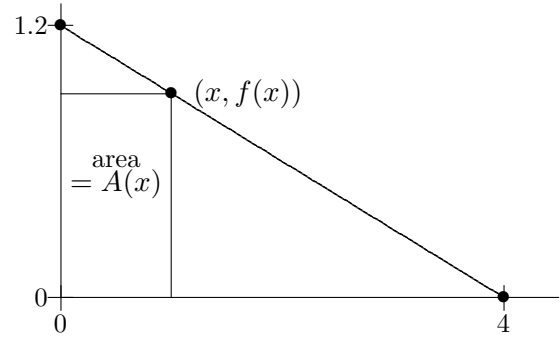
ANSWER: _____

- (c) The market price for Framits is \$22 per Framit. What is the smallest quantity you can produce and not lose any money?

ANSWER: $q =$ _____ thousand Framits.

2. (12 points)

The graph at right is of the linear function $f(x)$. A new function $A(x)$ is defined as the area of the rectangle as shown with one corner at the point $(x, f(x))$.



- (a) The x - and y -intercepts of $f(x)$ are shown on the graph. Use this information to find a formula for $f(x)$.

ANSWER: $f(x) =$ _____

- (b) Give the largest interval on which the area function $A(x)$ is increasing. (You must show some work to justify your answer.)

ANSWER: from $x =$ _____ to $x =$ _____

- (c) Find the largest value of x for which $A(x)$ is equal to 1.

ANSWER: $x =$ _____

3. (12 points) The amount of water (in gallons) that has flowed into a vat after t minutes is given by the formula

$$I(t) = -2t^2 + 14t.$$

- (a) The incremental rate of flow into the vat over the five-minute interval starting at time t is

$$R(t) = \frac{I(t+5) - I(t)}{5}.$$

Write out the formula for $R(t)$ and simplify as much as possible.

ANSWER: $R(t) =$ _____

- (b) Water flows out of the vat at a constant rate of 0.25 gallons per minute. At $t = 0$, there are 50 gallons in the vat. Give a formula for $A(t)$, the amount of water that the vat contains after t minutes. Simplify as much as possible.

ANSWER: $A(t) =$ _____

- (c) What is the highest level that the water in the vat reaches?

ANSWER: _____ gallons

4. (13 points) The marginal revenue and marginal cost (both in dollars) for selling q Bobbles are given by

$$MR(q) = -0.5q + 800 \text{ and } MC(q) = 0.4q + 558.8.$$

- (a) Find the quantity that yields maximum profit.

ANSWER: $q =$ _____ Bobbles

- (b) Find the quantity at which MR exceeds MC by \$94.50.

ANSWER: $q =$ _____ Bobbles

- (c) Recall that, if $MR(q) = aq + b$, then $TR(q) = \frac{a}{2}q^2 + (b - \frac{a}{2})q$. Find the quantity at which average revenue (AR) is 725.25 dollars per Bobble.

ANSWER: $q =$ _____ Bobbles