

MATH 111 C
Exam II
November 17, 2011

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	12	
2	13	
3	13	
4	12	
Total	50	

- Please check that your exam contains 4 problems.
- Turn your cell phone OFF and put it away for the duration of the exam.
- You may not listen to headphones or earbuds during the exam.
- Unless otherwise indicated, you may round your **final answer** to two digits after the decimal.
- Unless otherwise indicated, you must show your work or write a few words to justify your answers. Clearly show all calculations. The correct answer with no supporting work may result in no credit.
- You are expected to use the methods of this course. If you use a guess-and-check method or read a value from a graph on your calculator when an algebraic method is available, you may not receive full credit.
- There are multiple versions of the exam, you have signed an honor statement, and cheating is a hassle for everyone involved. DO NOT CHEAT.
- Put your name on your sheet of notes and turn it in with the exam.

GOOD LUCK!!

1. (12 points) You sell Things. Your marginal revenue and marginal cost (both in **dollars per Thing**) for selling q **hundred Things** are given by:

$$MR(q) = 33 - 3q \text{ and } MC(q) = 5q + 3.$$

- (a) Find the quantity that maximizes profit.

ANSWER: $q =$ _____ hundred Things

- (b) Compute the change in **total revenue** (TR) that occurs when quantity increases from 400 Things to 401 Things.

ANSWER: \$ _____

- (c) Your average cost is $AC(q) = 2.5q + 3 + \frac{15}{q}$. Compute the breakeven price.

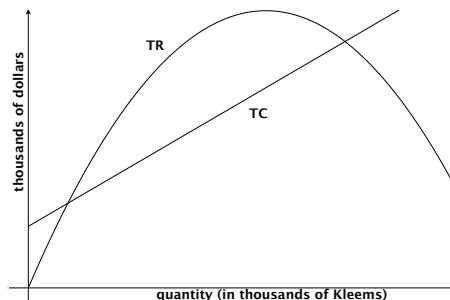
ANSWER: \$ _____ per Thing

2. (13 points)

You sell Kleems. Your total revenue and total cost (both in **thousands of dollars**) for producing and selling q **thousand Kleems** are given by

$$TR(q) = -0.16q^2 + 24q \text{ and } TC(q) = 6q + 210.$$

The graphs of these functions are given at right.



(a) Give the largest value of q at which profit is not negative.

ANSWER: $q =$ _____ thousand Kleems

(b) Give the longest interval on which TR and profit are both increasing.

ANSWER: from $q =$ _____ to $q =$ _____

(c) What is the largest possible profit on an order of Kleems? Include units.

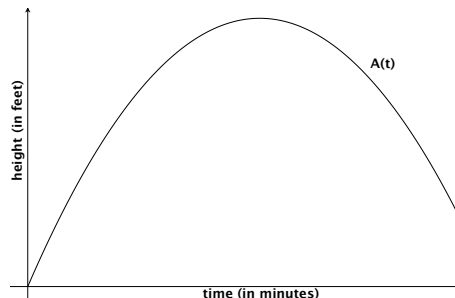
ANSWER: _____; UNITS: _____

3. (13 points)

Balloon A is released from ground level at $t = 0$. The height (in feet) of Balloon A after t minutes is given by

$$A(t) = -0.15t^2 + 9t.$$

The graph of $A(t)$ is given at right.



(a) Give a formula for $\frac{A(5+h) - A(5)}{h}$ and simplify as much as possible.

ANSWER: $\frac{A(5+h) - A(5)}{h} =$ _____

(b) Balloon B has a linear height vs. time graph. Balloon B is at the same height as Balloon A at $t = 0$ and $t = 55$. Find the formula for the height (in feet) of Balloon B after t minutes.

ANSWER: $B(t) =$ _____

(c) The average rate of ascent of Balloon A is $\frac{A(t)}{t}$ and the average rate of ascent of Balloon B is $\frac{B(t)}{t}$. Find the time at which the average rate of ascent of Balloon B is exactly 4 feet per minute faster than the average rate of ascent of Balloon A .

ANSWER: $t =$ _____ minutes

4. (12 points) You sell Blammos. The total cost to produce q Blammos is

$$TC(q) = 5 + \sqrt{q + 36} \text{ dollars.}$$

- (a) Give the value of your fixed costs and the formula for variable cost at q Blammos.

ANSWER: $FC = \$$ _____; $VC(q) =$ _____

- (b) Compute the value of marginal cost (MC) at $q = 20$ Blammos.

ANSWER: $MC(20) =$ _____ dollars

- (c) Find the quantity at which the average cost (AC) is exactly 3 dollars per Blammo. (Your answer need not be a whole number of Blammos.)

ANSWER: $q =$ _____