

MATH 111 B
Exam II
November 18, 2010

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	20	
3	17	
Total	50	

- Please check that your exam contains 3 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 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.
- 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) Here are the formulas for two quadratic functions:

$$f(x) = -x^2 + 12x + 4 \text{ and } g(x) = 4x^2 - 12x + 10.$$

- (a) Write out the formula for

$$\frac{f(x+5) - f(x)}{5}$$

and simplify as much as possible.

- (b) Give the longest interval on which $g(x)$ and $f(x) - g(x)$ are both increasing.

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

- (c) Which value of x in the interval from $x = 7.25$ to $x = 7.99$ makes $f(x)$ the largest?

ANSWER: $x =$ _____

2. (20 points) You sell Things. The formula for total cost is

$$TC(q) = 0.1q^3 - 3q^2 + 35q + 15,$$

where q is in **hundreds of Things** and TC is in **hundreds of dollars**.

- (a) Compute the **average cost** to produce 450 Things. Include units with your answer.

ANSWER: _____ UNITS: _____

- (b) Give formulas for **variable cost** and **average variable cost** for selling q hundred Things.

ANSWER: $VC(q) =$ _____
 $AVC(q) =$ _____

- (c) Find all values of q at which **average variable cost** is 18 dollars per Thing.

ANSWER: (list all) $q =$ _____ hundred Things

- (d) Compute the shutdown price.

ANSWER: _____ dollars per Thing

- (e) The graph of total revenue is a straight line and **profit** is 0 when $q = 20$ hundred Things. Find the formula for $TR(q)$.

ANSWER: $TR(q) =$ _____

3. (17 points) The following formulas give the amount of water (in gallons) in two vats (vat A and vat B) at time t minutes.

$$A(t) = 5t - 3\sqrt{t} + 2 \text{ and } B(t) = 7\sqrt{t}.$$

- (a) What is the change in the water level in vat B from $t = 4$ to $t = 25$?

ANSWER: _____gallons

- (b) How much water is in vat A when there are 42.7 gallons in vat B ?

ANSWER: _____gallons

- (c) Name all times at which vat B contains exactly 2 gallons more than vat A .

ANSWER: (list all) $t =$ _____minutes

- (d) A third vat, vat C , always contains exactly three gallons more than vat A . Which of the following are TRUE for every value of t ? (Circle all the TRUE statements. You do not need to show any work or justify your answers.)

- i. $A(t) = C(t) + 3$
- ii. $A(t) = C(t + 3)$
- iii. $C(t) = A(t) + 3$
- iv. $A(t) = C(t - 3)$
- v. $C(t) - A(t) = 3$
- vi. $C(t) = A(t) - 3$