

MATH 111
Exam II - Version 1
November 10, 2005

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	15	
2	15	
3	20	
Total	50	

- Your exam should consist of this cover sheet, followed by 3 problems on 4 pages. Check that you have been given a complete exam.
- Please turn your cell phone OFF and put it away for the duration of the exam.
- Unless otherwise indicated, you must show your work. 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!

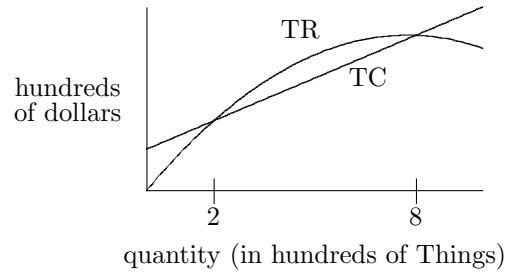
1. (15 points)

You sell Things. The formula for total revenue (in hundreds of dollars) at q hundred Things is:

$$TR(q) = 124q - 8q^2.$$

Total cost is a **linear** function of q . The two quantities at which you break even are $q = 2$ and $q = 8$ hundred Things. That is,

$$TC(2) = TR(2) \text{ and } TC(8) = TR(8).$$



(a) What quantity will yield the largest total revenue?

ANSWER: $q =$ _____ hundred Things

(b) What is the value of your fixed cost?

ANSWER: $FC =$ _____ hundred dollars

(c) For what quantity do you pay 596.6 hundred dollars in total cost?

ANSWER: $q =$ _____ hundred Things

(d) What is the largest possible value of profit?

ANSWER: _____ hundred dollars

2. (15 points) You sell Moonbeams. The total cost, in dollars, for selling q Moonbeams is given by the formula:

$$TC(q) = 0.2q^3 - 3q^2 + 20q + 120.$$

- (a) Compute $MC(6)$, marginal cost at $q = 6$ Moonbeams.

ANSWER: _____ dollars

- (b) For each of the following, set up the equation that you would solve in order to answer the question. In each, put your equation in the form

$$Aq^3 + Bq^2 + Cq + D = 0,$$

but do not attempt to solve the equation.

- i. Find the quantity at which average cost (AC) is \$20 per Moonbeam.

ANSWER: _____

- ii. Find the quantity at which variable cost (VC) is \$90.

ANSWER: _____

- (c) Recall that shutdown price is the smallest value of average variable cost (AVC). Give a formula for average variable cost and find the shutdown price.

ANSWER: $AVC(q) =$ _____

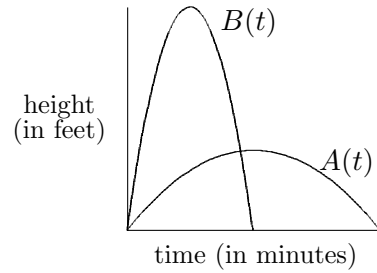
shutdown price = \$ _____

3. (20 points)

Two balloons are released at the same time. Each balloon goes up for a while and then begins to descend. For each balloon, the graph of the height (in feet) above the ground after t minutes is shown at right. The height functions are given by the formulas:

$$A(t) = -4t^2 + 184t$$

$$B(t) = -45t^2 + 1032t.$$



(a) Write out the formula for $\frac{B(t+2) - B(t)}{2}$ and simplify as much as possible.

ANSWER: $\frac{B(t+2) - B(t)}{2} =$ _____

(b) When is the B balloon 1000 feet higher than the A balloon for the first time?

ANSWER: $t =$ _____ minutes

(This question is continued on the next page.)

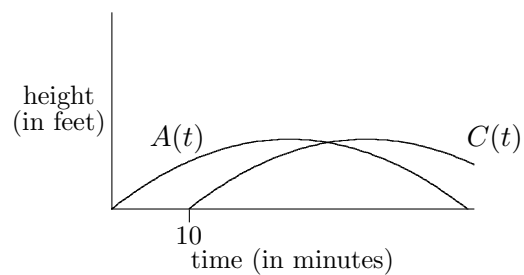
Once again, the formulas for the balloons' heights are:

$$A(t) = -4t^2 + 184t \text{ and } B(t) = -45t^2 + 1032t.$$

(c) When is the B balloon above the A balloon by the greatest distance?

ANSWER: $t =$ _____ minutes

(d) A third balloon, balloon C , has a height graph that looks exactly like balloon A 's height graph shifted 10 units to the right as shown.



Determine whether each of the following statements is True (T) or False (F). (Circle your answer.)

- i. T F For times after 10 minutes, $C(t) = A(t - 10)$.
- ii. T F Balloons A and C reach the same maximum height.
- iii. T F Balloon A and Balloon C are never at the same height at the same time.
- iv. T F Balloon A is always higher than Balloon C .

(e) When does Balloon C return to the ground?

ANSWER: $t =$ _____ minutes