Math 111 - Winter 2008
Exam 2
February 21, 2008

Name: _____

Quiz Section: _____

Student ID Number: _____

1	16	
2	16	
3	18	
Total	50	

- You are allowed to use a calculator, a ruler, and one **hand-written** 8.5 by 11 inch page of notes.
- Check that your exam contains all the problems listed above.
- You must **show and explain your work** on all problems. The correct answer with no supporting work may result in no credit.
- Put your name on your sheet of notes and turn it in with the exam.
- Any student found engaging in academic misconduct will receive a score of 0 on this exam. All suspicious behavior will be reported to the student misconduct board. In such an instance, you will be force to meet in front of a board of professors to explain your actions. The board typically decides to either put a student on academic probation or to expel the student.
  DO NOT CHEAT OR DO ANYTHING THAT LOOKS SUSPICIOUS!
  WE WILL REPORT YOU AND YOU MAY BE EXPELLED!
- There are multiple versions of the exam so if you copy off a neighbor and put down the answers from another version we will know you cheated.

GOOD LUCK!

1. (16 pts) The variable cost and total revenue for items are given by

$$TC(q) = q^2 + 5q + 10 \quad \text{and} \quad TR(q) = 25q,$$

where q is in items, $TC(q)$ and $TR(q)$ are in dollars.

(a) (4 pts) What is the variable cost at $q = 4$ items?

ANSWER: $VC(4) =$ _____ dollars

(b) (4 pts) Recall $MC(q) = TC(q+1) - TC(q)$. Find and simplify the formula for marginal cost.

ANSWER: $MC(q) =$ _____ dollars

(c) (4 pts) At what quantity q is the profit greatest? What is the greatest profit?

ANSWER: $q =$ _____ items

Max Profit = _____ dollars

(d) (4 pts) Find all quantities at which profit is exactly 26 dollars.

ANSWER: $q =$ _____ items

2. (16 points) Two cars, A and B, are driving on a straight road away from the city of Yakima. The distance from Yakima for **Car** A at time t hours is given by

$$D_A(t) = t^3 - 7t^2 + 20t \quad \text{(in miles)}.$$

The average trip speed for **Car** B at time t hours is given by

$$ATS_B(t) = 9 + 2t \quad \text{(in mph)}.$$

Recall $ATS(t) = \dfrac{D(t)}{t}$.

(a) (4 pts) Give the average trip speed formula for **Car** A and the distance formula for **Car** B at time t hours.

ANSWER: $ATS_A(t) =$ _____ mph

$D_B(t) =$ _____ miles

(b) (4 pts) Find the time at which **Car** A reaches its lowest average trip speed.

ANSWER: $t =$ _____ hours

(c) (4 pts) Give the average (incremental) speed for **Car B** over the interval from $t = 2$ to $t = 5$.

ANSWER: _____ miles per hour

(d) (4 pts) Find all times t at which the average trip speed for Car A is 5 mph faster than the average trip speed for Car B. (Round your answer to 2 digits after the decimal point).

ANSWER: $t =$ _____ hours

3. (18 points)

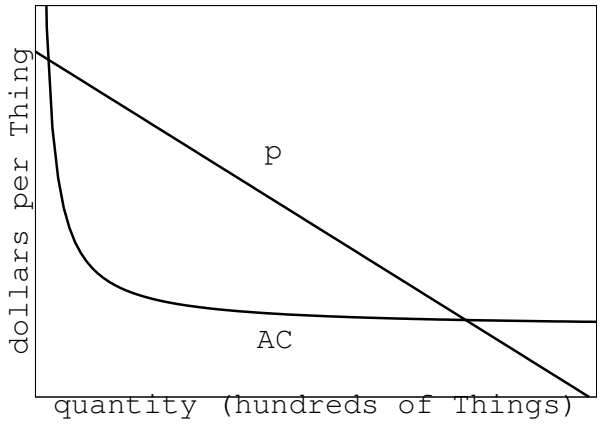
You sell Things. The price p per Thing on an order of q **hundred Things** is

$$p = 15 - 0.2q \text{ (dollars per Thing).}$$

The average cost (AC) per Thing on an order of q **hundred Things** is

$$AC(q) = 3 + \frac{20}{q} \text{ (dollars per Thing).}$$

The graphs of price, p, and average cost, AC, are given.



(a) (4 pts) Write out the formulas for the total revenue and total cost for selling q hundred Things.

ANSWER: $TR(q) =$ _____ hundred dollars

$TC(q) =$ _____ hundred dollars

(b) (2 pts) Find and simply the formula for average variable cost.

ANSWER: $AVC(q) =$ _____ dollars per Thing

(c) (4 pts) Find the largest value of total revenue (TR).

ANSWER: _____ hundred dollars

(d) (4 pts) What is the Marginal Cost at 500 Things? (Hint: In the formulas q is in hundreds, so one Things corresponds to a change in q of 0.01)

ANSWER: $MC(5) =$ _____ dollars

(e) (4 pts) Find all quantities at which the average cost is 14 dollars per Thing. (Round your answer to the nearest **Thing**.)

ANSWER: _____ **Things**