

NAME: _____

Student ID #: _____

QUIZ SECTION: _____

Math 111 C
Midterm II
November 19, 2009

Problem 1	20	
Problem 2	12	
Problem 3	18	
Total:	50	

- Your exam should contain **3 pages in total and 3 problems**. Please check your test for completeness.
- You **must use the methods of this class to solve the problems, and you must show entirely how you get your answers**. Work done “in your head” cannot get credit. Work done by guessing and checking, or by reading off values on a graphing calculator may get little credit. Correct answers with incomplete, wrong or missing work will get partial credit at best.
- Write your final answer in the indicated spaces.
- Unless otherwise specified, you may round off your final answer to the nearest two decimal digits.
- If you need more room, use the backs of pages and indicate to the reader that you have done so.
- Read each question carefully.
- Raise your hand if you have a question.

GOOD LUCK!

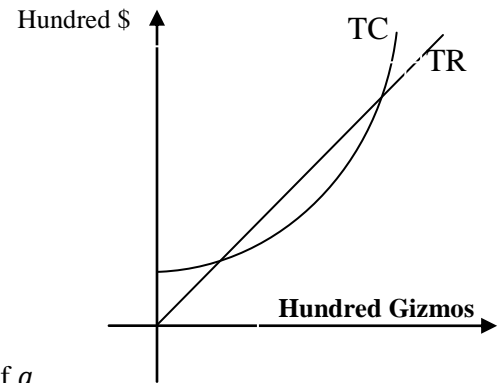
1. (20 pts) The graphs to the right are of the total cost TC and total revenue TR for producing and selling Gizmos.

The formula for the total cost is:

$$TC(q) = q^2 + 4.5q + 5$$

with q in **hundreds** of Gizmos, and TC in hundreds of dollars.

The TR graph is a line that goes through the origin and crosses the graph of TC at $q = 10$ hundred Gizmos.



- a) (4 pts) Write down a formula for the total revenue as a function of q .

$$TR(q) = \underline{\hspace{10cm}}$$

- b) (6 pts) What is the smallest quantity q at which the average cost is \$10 per Gizmo? (round your answer to 4 decimal digits)

$$\text{ANSWER: at } q = \underline{\hspace{2cm}} \text{ hundred Gizmos.}$$

- c) (4 pts) What is the marginal cost at 3 hundred Gizmos? (caution: q is in **hundreds** of Gizmos!)

$$\text{ANSWER: } MC(3) = \underline{\hspace{2cm}} \text{ hundred dollars}$$

- d) (6 pts) Compute the largest profit possible.

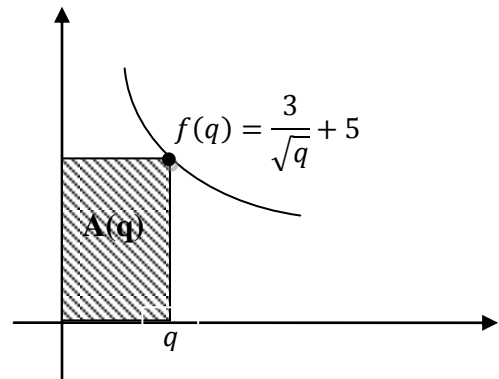
$$\text{ANSWER: Max profit is } \underline{\hspace{2cm}} \text{ hundred dollars.}$$

2. (12 pts) The graph to the right is of the function

$$f(q) = \frac{3}{\sqrt{q}} + 5$$

We define a new function $A(q)$ by:

$A(q)$ is the area of the rectangle under the graph, with one corner at the point $(q, f(q))$. (see picture)



a) (3 pts) Write out a formula for $A(q)$ in terms of q .

ANSWER: $A(q) =$ _____

b) (6 pts) Find the area of the rectangle at the point on the graph where $f(q) = 6$.

ANSWER: area = _____

c) (3 pts) Suppose the function $f(q) = \frac{3}{\sqrt{q}} + 5$ computes the average cost, in dollars per item, for producing q hundred items. In this case, what does the area of the rectangle function compute? What are its units? (no need to justify your answer)

ANSWER: $A(q)$ would compute the _____ at q hundred items,

in units of: _____

3. (18 points) A car drives for 4 hours on a straight road. Its distance, in miles, from its starting place at t hours is given by the formula:

$$D(t) = 100t - 25t^2$$

- a) (3 pts) At what time is this car the farthest away from its starting place?

ANSWER: at _____ hours

- b) (6 pts) Sketch the graph of $D(t)$ and compute the time interval when this car will be at a distance of at least 50 miles from its starting place.

ANSWER: from $t =$ _____ to $t =$ _____ hours

- c) (5 pts) Write the following expression as a linear function of t :

$$D(t + 0.5) - D(t) =$$

ANSWER: $D(t + 0.5) - D(t) =$ _____

- d) (4 pts) Find a time t such that the car traveled 25 miles during the half-hour time interval starting at t .

ANSWER: $t =$ _____ hours