

Math 111 - Winter 2004  
Mid-Term Exam Number Two  
February 24, 2004

Name: \_\_\_\_\_

Section: \_\_\_\_\_

1	12	
2	16	
3	10	
4	12	
Total	50	

- Complete all questions.
- You may use a calculator during this examination. Other electronic devices are not allowed.
- Turn your cell phone off and put it away for the duration of the exam.
- You may use one hand-written 8.5 by 11 inch page of notes.
- Show all work for full credit.
- You have 50 minutes to complete the exam.
- Please check that your exam contains four problems.
- Put your name on your sheet of notes and turn it in with the exam.

GOOD LUCK!!

1. You are in the business of manufacturing and selling ceramic whistles. To encourage large orders, you have a price per whistle that is a linear function of the order size. For an order of 10 whistles, you charge \$12 per whistle. For an order of 90 whistles, you charge \$8 per whistle.

(a) (4 points) Give the price per whistle as a function of the order size  $q$  in the form  $p = mq + b$ .

ANSWER:  $p =$  \_\_\_\_\_

(b) (4 points) Find a formula for total revenue ( $TR$ ) in terms of  $q$ .

ANSWER:  $TR(q) =$  \_\_\_\_\_

(c) (4 points) Find the order size  $q$  that gives the maximum revenue.

ANSWER:  $q =$  \_\_\_\_\_

2. On a cycling trip into the country, Sam and Sasa found that their distance ridden as a function of time was given by the function

$$D(t) = 1.6t^2 + 20t,$$

where  $D(t)$  is in kilometers, and  $t$  is the number of hours into their ride.

- (a) (4 points) At what time was their average trip speed 24 km/hour?

ANSWER:  $t =$  \_\_\_\_\_ hours

- (b) (4 points) How long did it take them to ride the first 100 km of their trip?

ANSWER: \_\_\_\_\_ hours

- (c) (3 points) Find a formula for their average speed over a one-hour interval starting at time  $t$ .

ANSWER: average speed = \_\_\_\_\_

- (d) (5 points) Find a one-hour interval over which their average speed was 23 km/hour.

ANSWER: From  $t =$  \_\_\_\_\_ to  $t =$  \_\_\_\_\_

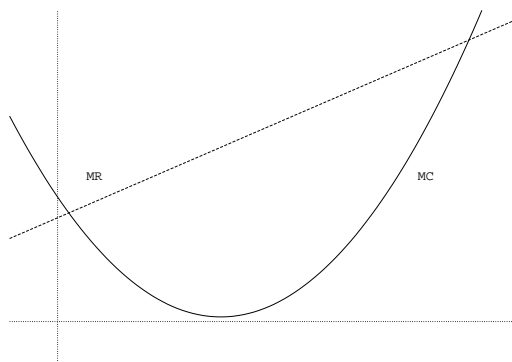
3. You are manufacturing and selling electric tongue depressors. Your marginal cost ( $MC$ ) function is

$$MC(q) = 0.05q^2 - 0.34q + 0.6$$

and your marginal revenue ( $MR$ ) function is

$$MR(q) = 0.5 + 0.1q$$

where  $q$  is in thousands of depressors. Both  $MC$  and  $MR$  are in dollars.



- (a) (5 points) What is the minimum value of marginal cost?

ANSWER: \_\_\_\_\_ dollars

- (b) (5 points) What value of  $q$  gives the maximum profit?

ANSWER:  $q =$  \_\_\_\_\_

4. You are in the business of manufacturing and selling dog tracking devices. The total cost ( $TC$ ), in dollars, for  $q$  devices is

$$TC(q) = 75 + \sqrt{q + 36}.$$

- (a) (3 points) What's the value of your fixed cost ( $FC$ )?

ANSWER:  $FC =$  \_\_\_\_\_ dollars

- (b) (4 points) Compute your variable cost ( $VC$ ) at  $q = 8245$ .

ANSWER:  $VC =$  \_\_\_\_\_ dollars

- (c) (5 points) Your devices sell for \$15 each. What is your average cost ( $AC$ ) if your total revenue ( $TR$ ) is \$135?

ANSWER:  $AC =$  \_\_\_\_\_ dollars