

MATH 111  
Exam 2 - Version 1  
November 18, 2004

Name \_\_\_\_\_

Student ID # \_\_\_\_\_

Section \_\_\_\_\_

1	17	
2	16	
3	17	
Total	50	

- You are allowed to use a calculator, a ruler, and one sheet of handwritten notes.
- Check that your exam contains three problems.
- You must show your work on all problems. The correct answer with no supporting work may result in no credit.
- If you use trial-and-error or a guess-and-check method when an algebraic method is available, you will not receive full credit.
- Write your answers in the specified locations. Unless otherwise indicated, you may round your **final answer** to two digits after the decimal.
- Raise your hand if you have a question.
- 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.
- You have 50 minutes to complete the exam.

GOOD LUCK!

1. (17 points) You are in the business of manufacturing and selling yorbles. You wish to encourage large orders, so you use a linear price list. For an order of 100 yorbles, you charge \$3.30 per yorble, while for an order of 250 yorbles, you charge \$3.00 per yorble. It costs you

$$TC(q) = 1.52q + 12$$

dollars to produce and ship  $q$  yorbles.

- (a) Find the linear formula for the price per yorble on an order of  $q$  yorbles.

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

- (b) What is the largest possible profit you can earn on an order of yorbles?

ANSWER: \$ \_\_\_\_\_

(This problem is continued on the next page.)

- (c) Find the quantity at which average cost (AC) is \$1.55 per yorble. (Your answer need not be a whole number of yorbles.)

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

- (d) Find all quantities  $q$  at which total revenue is twice as large as total cost. (Your answers need not be whole numbers of yorbles.)

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

2. (16 points) You manufacture and sell Geezbos. You can sell all the Geezbos you make for a market price of \$4.50 each. The variable cost (VC) to make  $q$  Geezbos is

$$VC(q) = 0.002q^2 + 0.4q$$

and your fixed costs (FC) are \$400.

- (a) Recall that  $MC(q) = TC(q+1) - TC(q)$ . Use this formula to compute  $MC(q)$ .

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

- (b) Determine a value of  $q$  at which marginal cost (MC) equals market price. (Your answer need not be a whole number of Geezbos.)

ANSWER:  $q =$  \_\_\_\_\_ Geezbos  
(This problem is continued on the next page.)

- (c) What is the smallest quantity  $q$  at which you just break even (i.e., profit=0)?  
(Your answer need not be a whole number of Geezbos.)

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

- (d) What manufacture level  $q$  will yield the maximum profit? (Your answer need not be a whole number of Geezbos.)

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

3. (17 points) Two bicyclists, A and B, are racing along a straight road. At time  $t = 0$ , they are side by side on the starting line. The speed of bicyclist A,  $t$  seconds later, is

$$S_A(t) = 40 - 0.22t \text{ feet per second.}$$

At time  $t$  seconds, bicyclist B is

$$D_B(t) = 35t - 0.075t^2 \text{ feet}$$

from the starting line.

- (a) When will bicyclist B's average trip speed be 22.25 feet per second?

ANSWER:  $t =$  \_\_\_\_\_ seconds

- (b) What is the average speed of bicyclist A over the time interval from  $t = 2$  to  $t = 5$  seconds?

ANSWER: average speed = \_\_\_\_\_ feet per second

(This problem is continued on the next page.)

- (c) Find a formula for  $D_A(t)$ , bicyclist A's distance from the starting line after  $t$  seconds.

ANSWER:  $D_A(t) =$  \_\_\_\_\_

- (d) The finish line is 3500 feet beyond the bicyclists' location at  $t = 0$ . Which bicyclist reaches the finish line first (i.e., who wins)?

ANSWER: (circle one)    A    B