

Math 111
Exam 2
November 18, 2014

Name: _____

Quiz Section: _____

Student ID Number: _____

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| 1 | 12 | |
| 2 | 12 | |
| 3 | 14 | |
| 4 | 12 | |
| Total | 50 | |

- Check that your exam contains four pages of problems in addition to this cover page.
- You are allowed to use a basic scientific calculator, a ruler, and one **hand-written** 8.5 by 11 inch page of notes. Put your name on your sheet of notes and turn it in with the exam.
- Using methods we have discussed, you must provide work that shows how you got your answer. If you want more space, you can write on the backs of the previous page and indicate to the grader that you have done so.
- Put your final answer on the lines provided with the problems.
- Raise your hand if you have a question. Your TA can only clarify the wording of a question, he/she cannot comment on your work.
- 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. 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 forced to meet in front of a board of professors to explain your actions.
DO NOT CHEAT OR DO ANYTHING THAT LOOKS SUSPICIOUS!
WE WILL REPORT YOU AND YOU MAY BE EXPELLED!
Keep your eyes down and on your paper. If your TA sees your eyes wandering they will warn you only once before taking your exam from you.
- You have 50 minutes to complete the exam. Use your time wisely: Spend no more than 10 minutes on each page before moving on to the next page.

GOOD LUCK!

1. (12 points)

(a) Suppliers are willing to produce 56 items if the price is \$440/item and 136 items if the price is \$530/item. The supply curve is **linear**.

i. Give the equation for the supply curve. (Use p for price and q for quantity).

$$p = \underline{\hspace{10cm}}$$

ii. You are also told that the demand curve is $2p + 6q = 1447$.

Find the quantity and price that corresponds to market equilibrium.

$$q = \underline{\hspace{10cm}} \text{ items}$$

$$p = \underline{\hspace{10cm}} \text{ dollars/item}$$

(b) Solve $3(1 + 4e^{0.1x}) = 27$ for x (give your final answer accurate to 3 digits after the decimal).

$$x = \underline{\hspace{10cm}}$$

2. (12 points) You are given average variable cost and marginal cost for a product:

$$AVC(x) = x^2 - 3.4x + 7 \text{ dollars/item} \quad \text{and} \quad MC(x) = 3x^2 - 6.8x + 7 \text{ dollars/item,}$$

where x is in thousands of items. You also know that fixed cost is $FC = 2$ thousand dollars.

Round your final answers to the nearest item or nearest cent.

(a) Find and simplify the formulas for total cost and average cost.

$$TC(x) = \text{_____ thousand dollars}$$

$$AC(x) = \text{_____ dollars/item}$$

(b) Find the shutdown price.

$$SDP = \text{_____ dollars/item}$$

(c) Find the range of quantities over which $MC(x)$ is less than or equal to \$6 per item.

$$x = \text{_____ to } x = \text{_____ thousand items}$$

3. (14 points) The total cost to produce x tennis balls is given by: $TC(x) = 0.5x + 42$ dollars.
 The price per ball for an order of x tennis balls is given by: $p = 4 - 0.05x$ dollars/ball.
- (a) Find the quantity at which Average Cost is equal to \$7.50 per ball.

$$x = \text{_____} \text{ balls}$$

- (b) Find and simplify the formulas for Total Revenue and Marginal Revenue.
 (Recall: $MR(x) = TR(x + 1) - TR(x)$).

$$TR(x) = \text{_____} \text{ dollars}$$

$$MR(x) = \text{_____} \text{ dollars/ball.}$$

- (c) Find the price that corresponds to maximum profit.

$$p = \text{_____} \text{ dollars/ball.}$$

4. (12 points) Your company makes two kinds of soda: Regular and Diet.

Your total daily production of soda is limited to 1000 gallons.

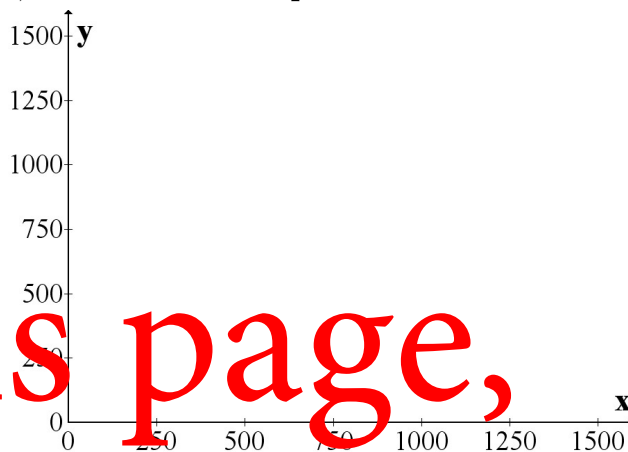
Production requires 2 cup of sugar per gallon of Regular and $\frac{1}{2}$ cup of sugar per gallon of Diet. Today, you are limited to 626 cups of sugar.

The profit is \$1 per gallon of Regular soda and \$1.20 per gallon of Diet soda.

Let x = the gallons of Regular soda and y = the gallons of Diet soda that you produce and sell.

(a) Give the constraints, then sketch and shade the feasible region.

You **must** label ALL x -intercepts, y -intercepts, and **intersection points** for full credit.



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(b) How much of each type of soda should you produce to give maximum profit?

Also give the value of maximum profit. (Show your work)

x = _____ gallons of Regular soda

y = _____ gallons of Diet soda

Max Profit = _____ dollars