Math 111
Exam 1
October 21, 2014

Name: _____

Quiz Section: _____

Student ID Number: _____

1	14	
2	13	
3	12	
4	11	
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.

- You must **show your work** on all problems. On problems in which you use a graph, draw lines and *clearly* label them in the graph. Your work and explanations on each problem should be very brief, so you should be able to fit them in the space provided. However, 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. (14 points) The graphs of **variable cost** for producing tablets are given. The x-axis is in tablets and the y-axis in in dollars. **You are told that fixed costs (FC) are equal to 600 dollars!**.
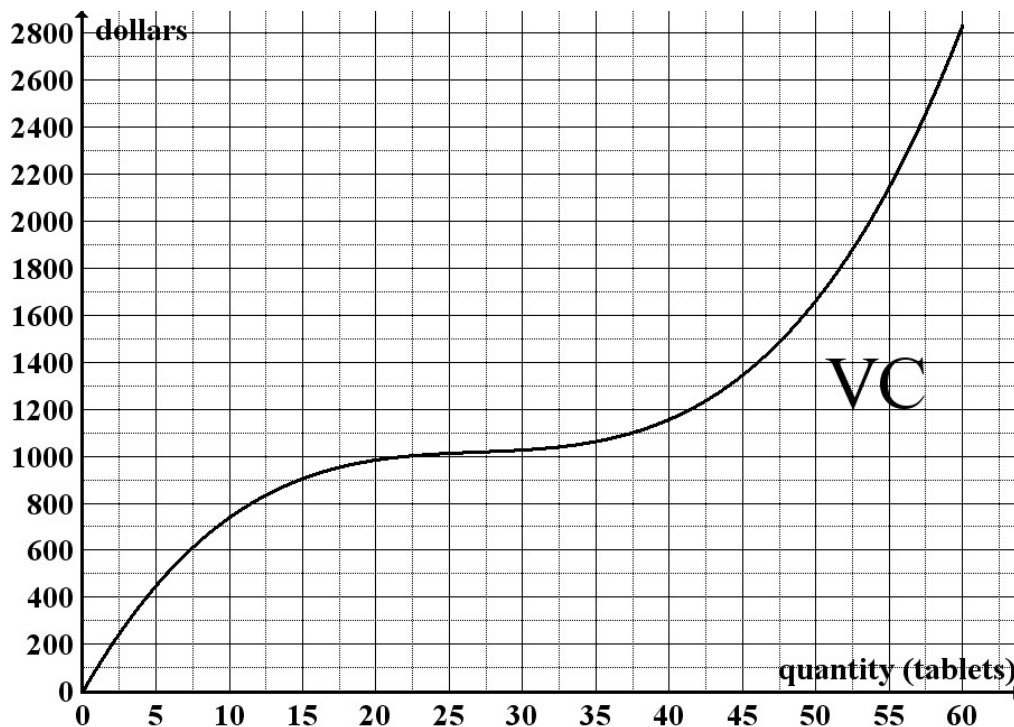
Make sure to **read the description above the graph** before you do the problems! Show and label your work in the graph.

(a) Find the **Shutdown Price** (SDP).

$$SDP = \underline{\hspace{3cm}} \text{ dollars per tablet}$$

(b) Find the **average cost** at $q = 15$ tablets.

$$AC(15) = \underline{\hspace{3cm}} \text{ dollars per tablet}$$

(c) Give the longest interval of quantities over which marginal cost is **at most** 20 dollars per tablet.

$$\text{from } q = \underline{\hspace{3cm}} \text{ to } q = \underline{\hspace{3cm}} \text{ tablets}$$

(d) Suppose the market price is \$55.00 per tablet. Find the quantity that maximizes profit and give the value of maximum profit.

$$q = \underline{\hspace{3cm}} \text{ tablets and Profit} = \underline{\hspace{3cm}} \text{ dollars}$$

2. (13 points) The graph below gives the amount of water, $A(t)$, that flows out of a reservoir over a 12-hour period beginning at midnight. The amount, $A(t)$, is in thousands of gallons and the time t is in hours after midnight.
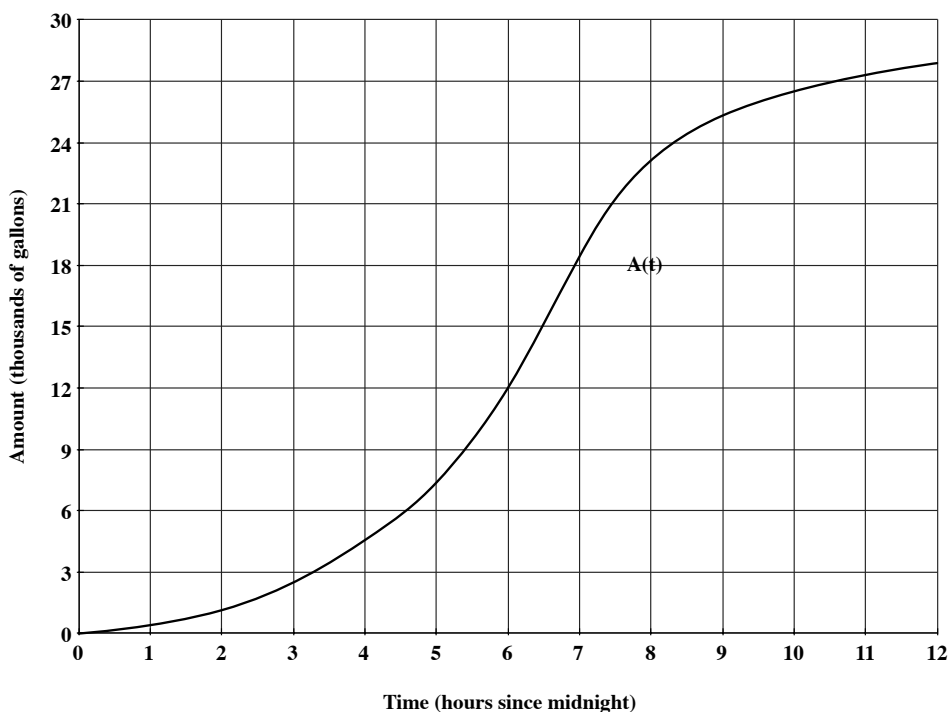
Show and label your work in the graph.

(a) During how many one-hour intervals is water flowing out at an average rate of 1.5 thousand gallons per hour?

number of one-hour intervals with average rates of 1.5 (Circle one):   0   1   2   3   4   5

(b) Find the largest overall rate of flow out of the reservoir.

_____ thousand gallons per hour

(c) Find a value of t such that $\dfrac{A(t) - A(6)}{t - 6} = 3.6$.

$t = $ _____ hours

(d) Suppose water flows into the reservoir at a constant rate of 1.2 thousand gallons per hour. What is the smallest amount of water needed in the reservoir at midnight so that the reservoir never has a shortage in this 12-hour period?

_____ thousand gallons

3. (12 points) Below are the graphs of **marginal cost**, **average cost**, and **average variable cost** for producing items. The quantities are in thousands of items and MC, AC, and AVC are in dollars per item.
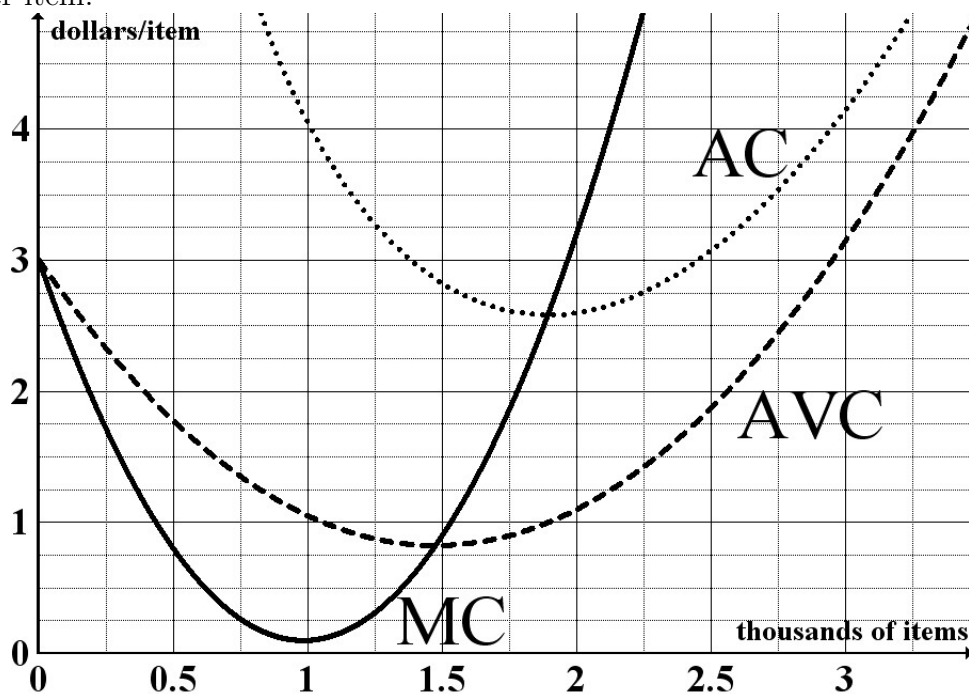
Show your work.

(a) Give the **variable cost** at 500 items.

$$VC(0.5) = \underline{\hspace{3cm}} \text{ thousand dollars}$$

(b) Give the breakeven price and the shutdown price.

$$BEP = \underline{\hspace{3cm}} \text{ dollars per item}$$
$$SDP = \underline{\hspace{3cm}} \text{ dollars per item}$$

(c) Suppose the market price is \$3.25 per item. Find the quantity that maximizes profit and give the value of maximum profit. (Put your units in the space provided)

$$q = \underline{\hspace{3cm}} \quad \text{units: } \underline{\hspace{4cm}}$$
$$\text{Profit} = \underline{\hspace{3cm}} \quad \text{units: } \underline{\hspace{4cm}}$$

4. (11 points) (Show your work)

(a) Solve the inequality $\dfrac{x}{3} + 5 < \dfrac{3(x-1)}{2}$ (That is, get x by itself.)

(b) The cost to rent a compact car from Budget is given by a linear function. You are told that the charge is \$65 for a 1 day rental and the charge is \$195 for an 11 day rental. Let x be the number of days you rent the car and $B(x)$ be the amount Budget will charge you.

  i. Find the linear function for $B(x)$. (Give your answer in the form $B(x) = mx + b$).

  ii. Assume Thrifty rents a similar car with the rental charge given $T(x) = 19x$. After how many days, x, with the rental charge at Thrifty be \$50 more than the rental charge at Budget?

(You must translate the question to functional notation and solve the equation for full credit).