AUTUMN 2008 (Nichifor)

NAME: _____ Student ID #: _____

QUIZ SECTION:_____

Math 111
Midterm I

October 21, 2008

Problem 1	**15**	
Problem 2	**8**	
Problem 3	**10**	
Problem 4	**17**	
Total:	**50**	

- You are allowed to use a calculator, a ruler, and one double-sided sheet of notes.
- Your exam should contain 4 pages in total and 4 problems. Check that your test is complete!
- You **must indicate how you get your answers**. Correct (or incorrect) answers with no justification may result in little or no credit. **On problems in which you use a graph, carefully draw all lines you use, label them, and mark all points clearly.**
- Write your **final answer in the indicated spaces**.
- If you need more room, use the backs of pages and indicate to the reader that you have done so.
- Raise your hand if you have a question.

GOOD LUCK!

Do you want me to post your grades so far (on the class website) under the last 4 digits of your student number?

☐ *Yes, please post my grades. Sign to give permission:* _____

☐ *No, please don't post my grades so far.*

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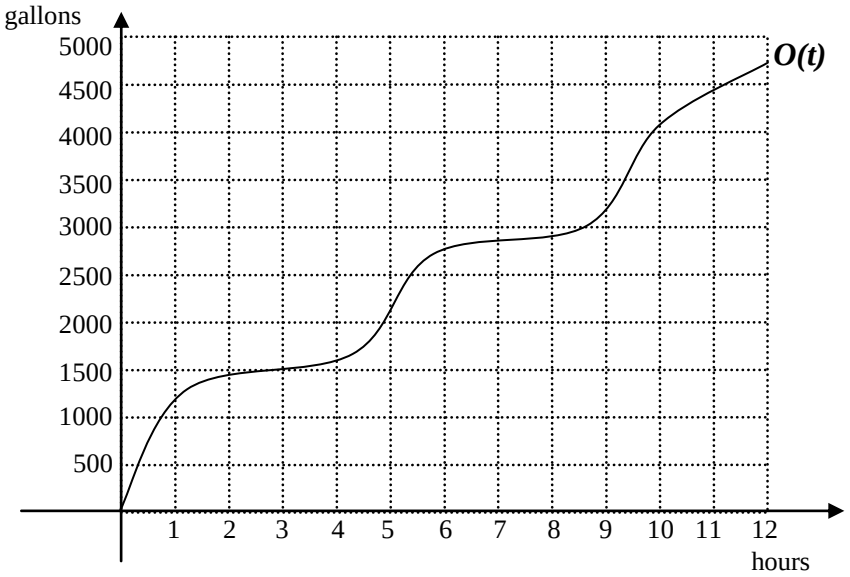
1. (15 points) The graph below is of the total amount of the water ***O(t)*** which was pumped **out** of a reservoir from noon until *t* hours later (during a 12 hour interval, starting at noon).



a) Compute the average rate of water pumped out of the reservoir from $t = 6$ hours to $t = 9$ hours.

ANSWER: _____ gallons per hour

b) A pipe brings water **into** the reservoir at the constant rate of 500 gallons per hour. What is the lowest initial amount of water needed in the reservoir, in order not to run out at any time before midnight?

ANSWER: We need at least _____ gallons of water in the reservoir initially

c) Find the lowest overall average rate of water pumped out of the reservoir during this 12 hour time interval.

ANSWER: _____ gallons per hour.

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2. **(8 points)** Let $P(t)$ denote the outside temperature, in degrees Fahrenheit (°F), at *t* hours past midnight.

a) Translate the following statement into a complete **English** sentence (including the correct units):

$$\frac{P(12) - P(6)}{12 - 6} = 10$$

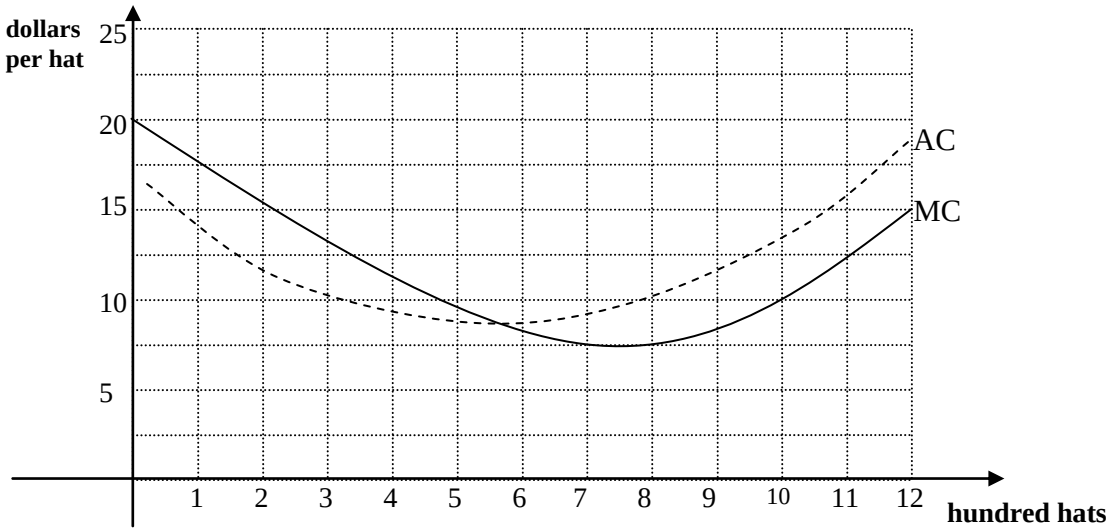
Translation:

b) Translate the following statement into **functional notation:**

"The temperature **decreased** by 5°F from 3am to 5am."

Translation:

3. (**10 points**) You run a business producing Halloween costumes. The graphs below represent the marginal cost (MC) and the average cost (AC), in dollars per item, for producing Dumbledore Wizard Hats. Note that the quantity q is in hundreds of hats.



a) If every Dumbledore Hat sells at a market price of $12.50 per hat, what quantity maximizes your profit?

ANSWER: q = _____ hundred hats

b) What is the total cost of producing 3 hundred hats? Give your answer in dollars.

ANSWER: $TC(3) = \$$_____

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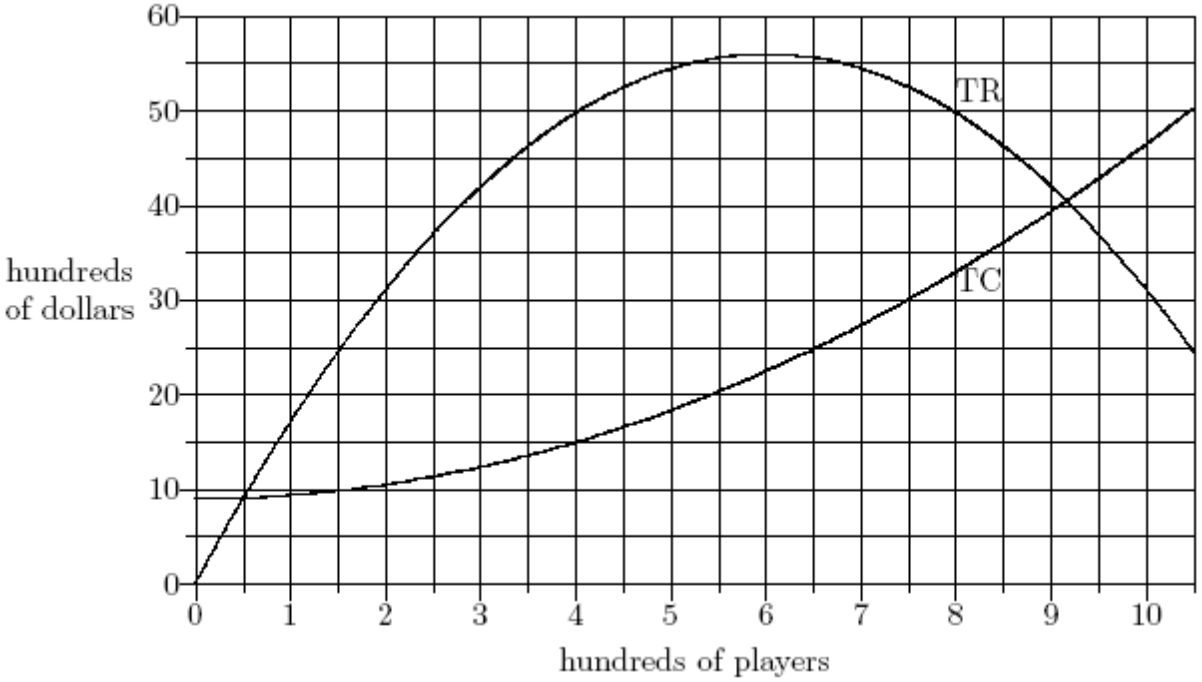
4. (17 points) You own a business producing MP3 players. The graphs below represent the total cost (TC) and total revenue (TR), in hundreds of dollars. Note that the quantity q is in hundreds of players.



a) Carefully estimate your maximal profit.

ANSWER: Max profit : _____ hundred dollars

b) At what quantity is the average cost (AC) $4.5 per player?

ANSWER: at q = _____ hundred players

c) Compute the marginal revenue and the marginal cost at 3 hundred players. Include correct units.

ANSWER: $MR(3)$ =_____, $MC(3)$ =_____, Units:_____

d) Will your **profit** increase or decrease if you produce and sell 301 players instead of 300 players? By how much?

ANSWER: Profit will increase/decrease (circle the correct one) by $ _____