MATH 111
Exam I - Version 2
October 28, 2004

Name _____

Student ID #_____

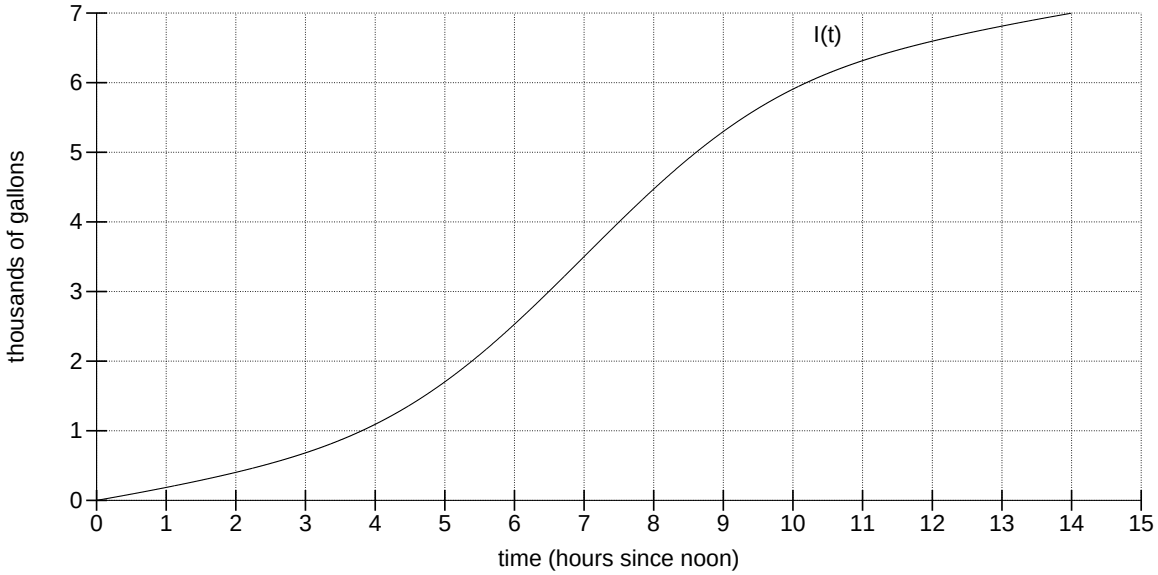
Section _____

1	15	
2	12	
3	11	
4	12	
Total	50	

- You are allowed to use a calculator, a ruler, and one sheet of handwritten notes.
- Check that your exam contains four problems.
- You must show your work on all problems. The correct answer with no supporting work may result in no credit. On problems in which you use a graph, draw lines and mark points clearly on the graph.
- Write your answers in the specified locations. Unless otherwise indicated, you may round your **final answer** to two digits after the decimal.
- If you need more room, use the backs of the pages and indicate to the reader that you have done so. If you still need more paper, please ask for some.
- 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. (15 points) The following is the graph of the amount of water that has flowed into a reservoir by various times over a 12-hour interval starting at noon. We abbreviate this amount by $I(t)$.



(a) Water flows out of the reservoir at a rate of 500 gallons per hour. Sketch the graph of $O(t)$, Water Out versus time since noon.

(b) What is the smallest amount of water we can start with to make sure there is always water avialable in the reservoir?

ANSWER: _____thousand gallons

(c) What is the largest value of $\dfrac{I(t)}{t}$?

ANSWER: _____thousand gallons per hour

(d) Find the longest time interval starting at $t = 7$ during which the level of water is rising.

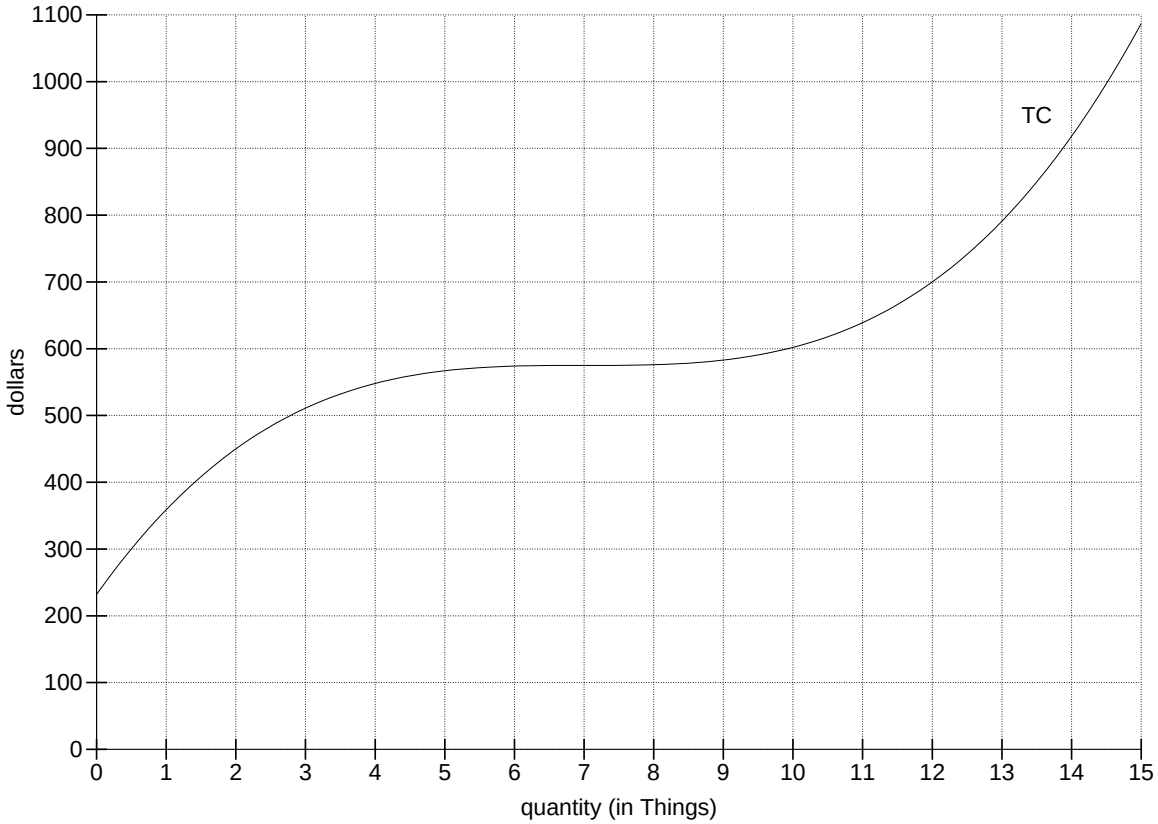
ANSWER: from $t = 7$ to $t =$_____

(e) Find a time t greater than 6 when

$$\frac{I(t+0.1) - I(t)}{0.1} < \frac{I(t)}{t}.$$

ANSWER: $t =$_____

2. (12 points) The following is the graph of total cost (TC) for selling Things.



(a) Compute marginal cost (MC) at $q = 4$ Things.

ANSWER: _____dollars

(b) For what production levels (quantities) is average cost (AC) between 70 and 200 dollars per Thing?

ANSWER: from $q =$_____to $q =$_____

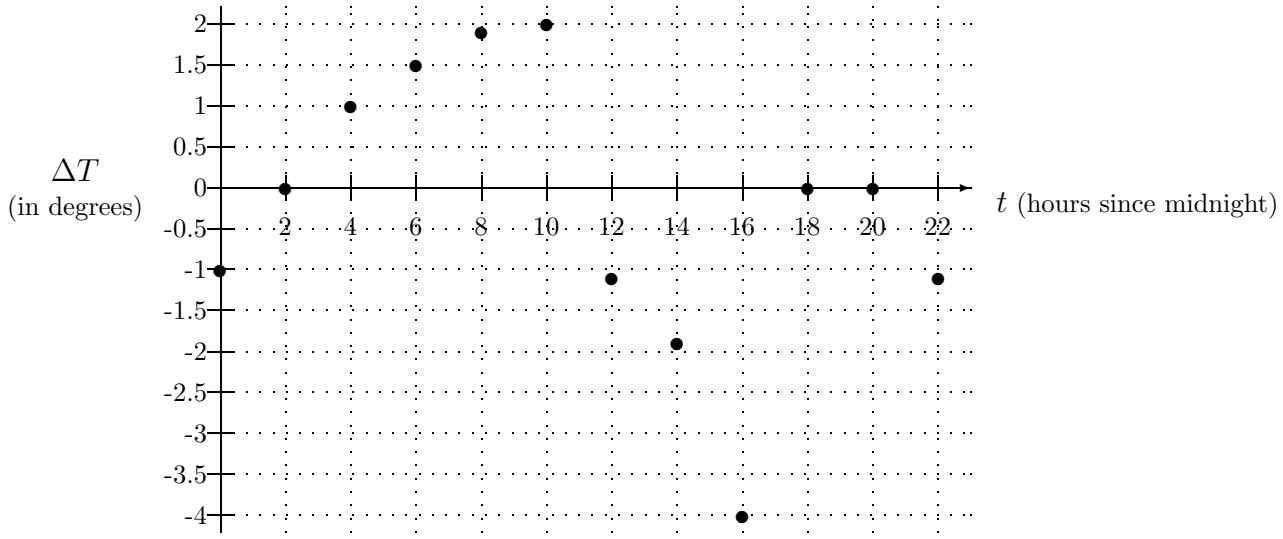
(c) Compute the average variable cost (AVC) at $q = 12$ Things.

ANSWER: _____dollars per Thing

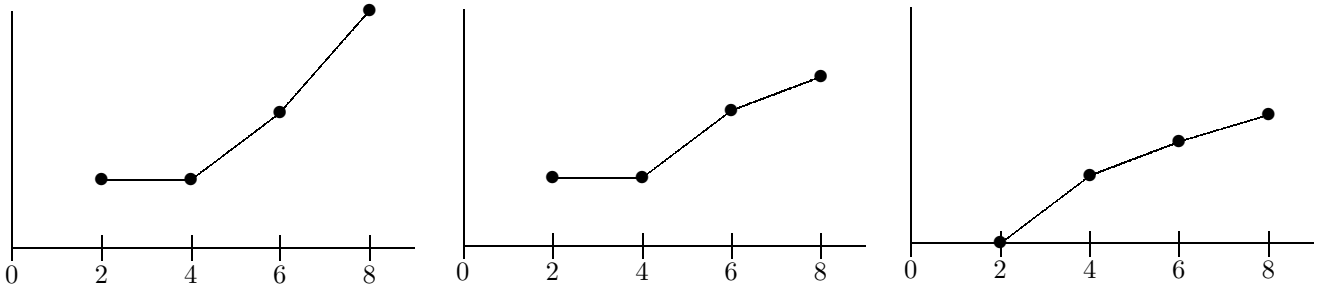
(d) Compute the breakeven price.

ANSWER: _____dollars

3. (11 points) The following graph gives the **change in temperature** in degrees Fahrenheit every two hours over a 24-hour period beginning at midnight. Each dot on the graph indicates the change in temperature over the *next* two hours.



(a) Which of the following graphs most closely resembles the graph of temperature from $t = 2$ to $t = 8$?



(i) (ii) (iii)

ANSWER: (circle one) (i) (ii) (iii)

(b) For each of the following, indicate whether the statement is True (T) or False (F) by circling the correct letter.

T F The temperature is higher at $t = 10$ than at $t = 12$.

T F The temperature at $t = 2$ is lower than the temperature at $t = 4$.

T F The temperature at $t = 6$ is the same as the temperature as the temperature at $t = 0$.

T F The temperature is higher at $t = 16$ than at $t = 18$.

T F The temperature falls from $t = 12$ to $t = 18$.

(c) What is the change in temperature from 4 a.m. to noon?

ANSWER: _____degrees

4. (12 points)

(a) Find the values of q for which $TR = TC$ if

$$TR = -q^2 + 28q \text{ and } TC = 80 + 10q.$$

ANSWER: $q =$_____ and $q =$_____

(b) (points) Find the intersection of the two lines:

$$y - 4x = 7 \text{ and } 8x - y = 2.$$

ANSWER: $x =$_____ and $y =$_____

(c) (points) Solve for x:

$$R = \frac{4x + 2}{x}.$$

ANSWER: $x =$_____