

MATH 111D
Exam I - Version 1
October 23, 2003

Name _____

Student ID # _____

Section _____

1	16	
2	18	
3	16	
Total	50	

Current grades will be posted on the course website after each exam. Please check one of the following:

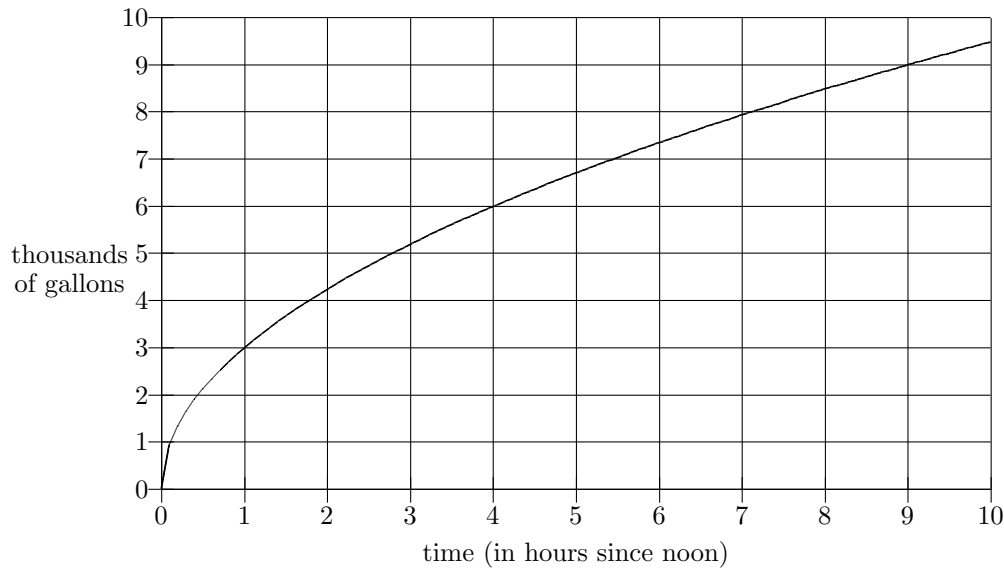
_____ I would like my grades to appear on the course website, listed by the last four digits of my student number.

_____ I would not like my grades to appear on the course website.

- You are allowed to use a calculator, a ruler, and one sheet of handwritten notes.
- You must show your work on all problems. The correct answer with no supporting work may result in no credit.
- Write your answers in the specified locations. Unless otherwise specified, you may round your **final answer** to two digits after the decimal.
- 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.

GOOD LUCK!

1. (16 points) The following gives the graph of the amount of water that has flowed into a reservoir since noon in thousands of gallons.



- (a) Compute the (incremental) average rate of flow into the reservoir from 2 p.m. to 5 p.m.

ANSWER: _____ thousand gallons per hour

- (b) At what time is the overall rate of flow into the reservoir equal to 2 thousand gallons per hour?

ANSWER: _____

- (c) Let $A(t)$ represent the amount of water that has flowed into the reservoir by time t hours.

- i. Translate the following into functional notation:

The incremental average rate of change of flow into the reservoir from 3:30 p.m. to a time h hours later is 1.6 thousand gallons per hour.

- ii. Translate the following into English: $A(h + 4) - A(h) = 3$.

2. (18 points) You sell *items*. The following table gives several values of total revenue (TR) and total cost (TC) for selling your items.

q	0	1	2	3	4	5	6	7	8	9	10	11	12
TR	0	133	252	357	448	525	588	637	672	693	700	693	672
TC	400	420	440	460	480	500	520	540	560	580	600	620	640

- (a) What is the value of fixed cost?

ANSWER: $FC = \$$ _____

- (b) Compute average cost (AC) and average variable cost (AVC) at $q = 3$ items.

ANSWERS: $AC = \$$ _____ $AVC = \$$ _____

- (c) The value of marginal cost (MC) is the same for all values of q . What is the value of MC ?

ANSWER: $MC = \$$ _____

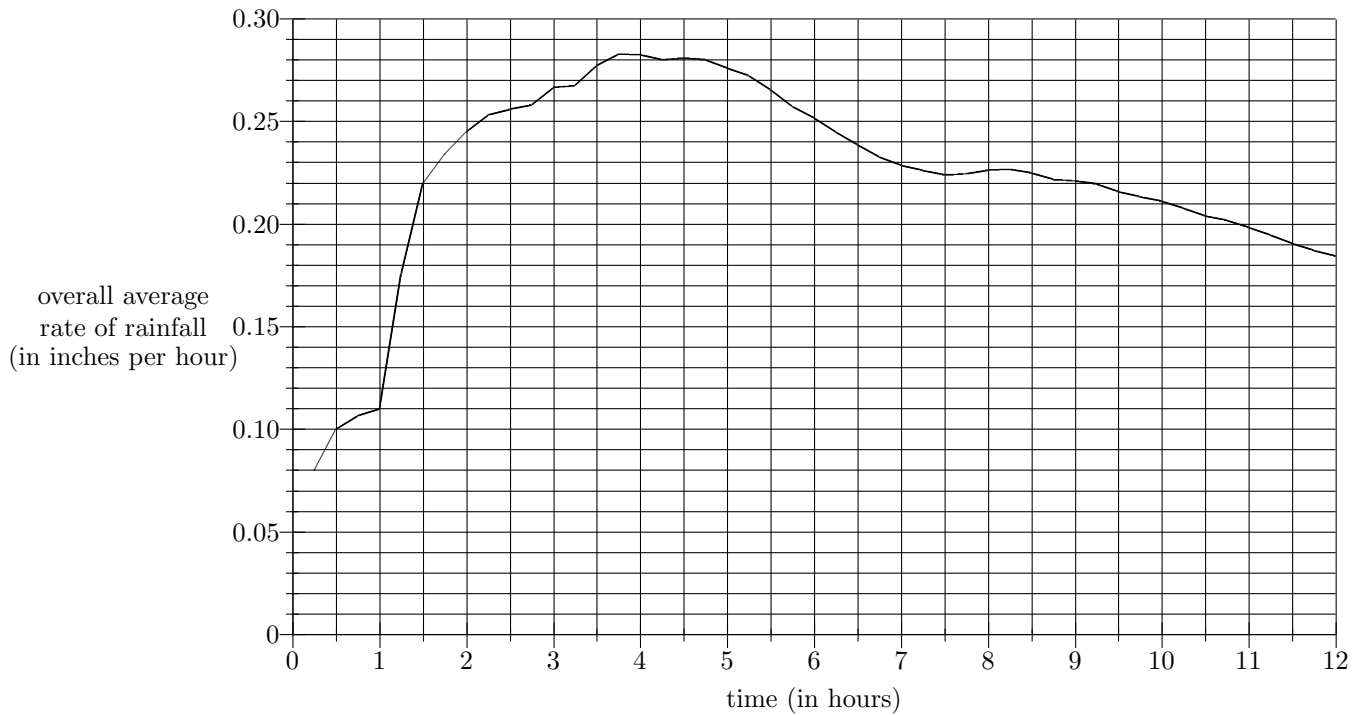
- (d) Fill in the missing value in this table.

q	0	1	2	3	4	5	6	7	8	9	10	11
MR	133	119	105	91		63	49	35	21	7	-7	-21

- (e) What quantity yields maximum profit?

ANSWER: $q =$ _____

3. (16 points) The following is the graph of the **overall average rate of rainfall** over a twelve-hour period on Monday, October 20, 2003, the rainiest day *ever*. That is, if $R(t)$ is the amount of rain that has fallen since $t = 0$, then this is the graph of $\frac{R(t)}{t}$.



- (a) Find all times at which the overall average rate of rainfall is 0.26 inches per hour.

ANSWER: $t =$ _____

- (b) Find the total amount of rain that had fallen by time $t = 7.5$.

ANSWER: _____ inches

- (c) How much rain fell from $t = 1$ to $t = 4$ hours?

ANSWER: _____ inches

- (d) What is the *incremental* average rate of rainfall from $t = 2$ to $t = 6$ hours?

ANSWER: _____ inches per hour