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

Name _____

Student ID #_____

Section _____

| | | |
|---|---|---|
| 1 | 16 | |
| 2 | 18 | |
| 3 | 16 | |
| Total | 50 | |

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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.

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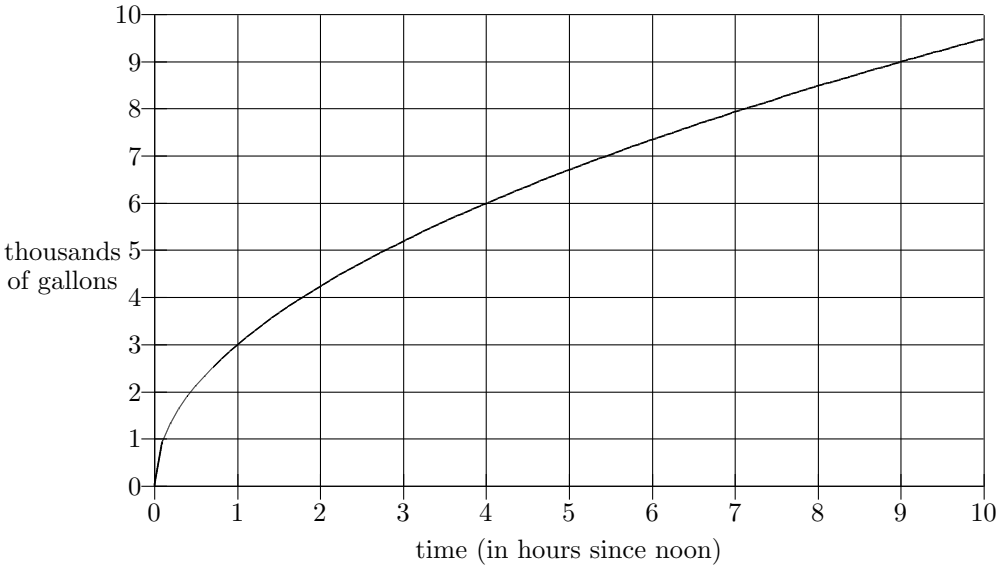
- You are allowed to use a calculator, a ruler, and one sheet of handwritten notes.
- You must show your work on all problems. The correct answer with no supporting work may result in no credit.
- Write your answers in the specified locations. Unless otherwise indicated, you may round your **final answer**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

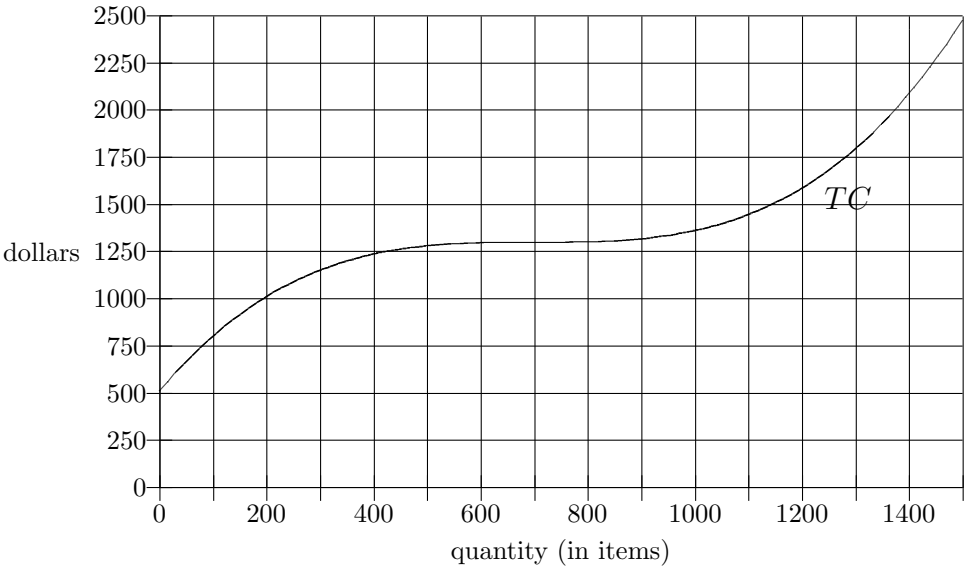
(c) Let $A(t)$ represent the amount of water that has flowed into the reservoir by time $t$ hours.

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 is the graph of total cost.




(a) What is the value of fixed cost?

ANSWER: $FC =$\$_____

(b) Estimate the value of marginal cost ($MC$) at $q = 400$ items.

ANSWER: $MC =$\$_____

(c) What is the breakeven price?

ANSWER: \$_____

(d) What is the average variable cost ($AVC$) at $q = 300$ items?

ANSWER: $AVC =$\$_____

(e) Items sell for \$2.50 each. Name the smallest quantity at which $TR = TC$.

ANSWER: $q =$_____

3. (16 points) A baby weighs 7.5 pounds at birth ($t = 0$). The baby's parents record the **incremental average rate of change** of her weight over four-month periods. The following chart gives these rates of change, measured in pounds per month.

| interval starting at $t =$ | 0 | 4 | 8 | 12 | 16 | 20 |
|---|---|---|---|---|---|---|
| rate of change | 1.7 | 1.375 | 0.575 | 0.3875 | 0.825 | 0.4125 |

(a) How many pounds did the baby gain during the first four months?

ANSWER: _____ pounds

(b) The baby weighs 28.6 pounds on her second birthday ($t = 24$ months). How much did she weigh eight months before that?

ANSWER: _____ pounds

(c) What is the overall rate of change in the baby's weight at $t = 8$?

ANSWER: _____ pounds per month

(d) What is the incremental rate of change in the baby's weight over the twelve-month period from $t = 4$ to $t = 16$ months?

ANSWER: _____ pounds per month