

MATH 111B
Exam I
October 19, 2006

Name _____

Student ID # _____

Section _____

HONOR STATEMENT

“I affirm that my work upholds the highest standards of honesty and academic integrity at the University of Washington, and that I have neither given nor received any unauthorized assistance on this exam.”

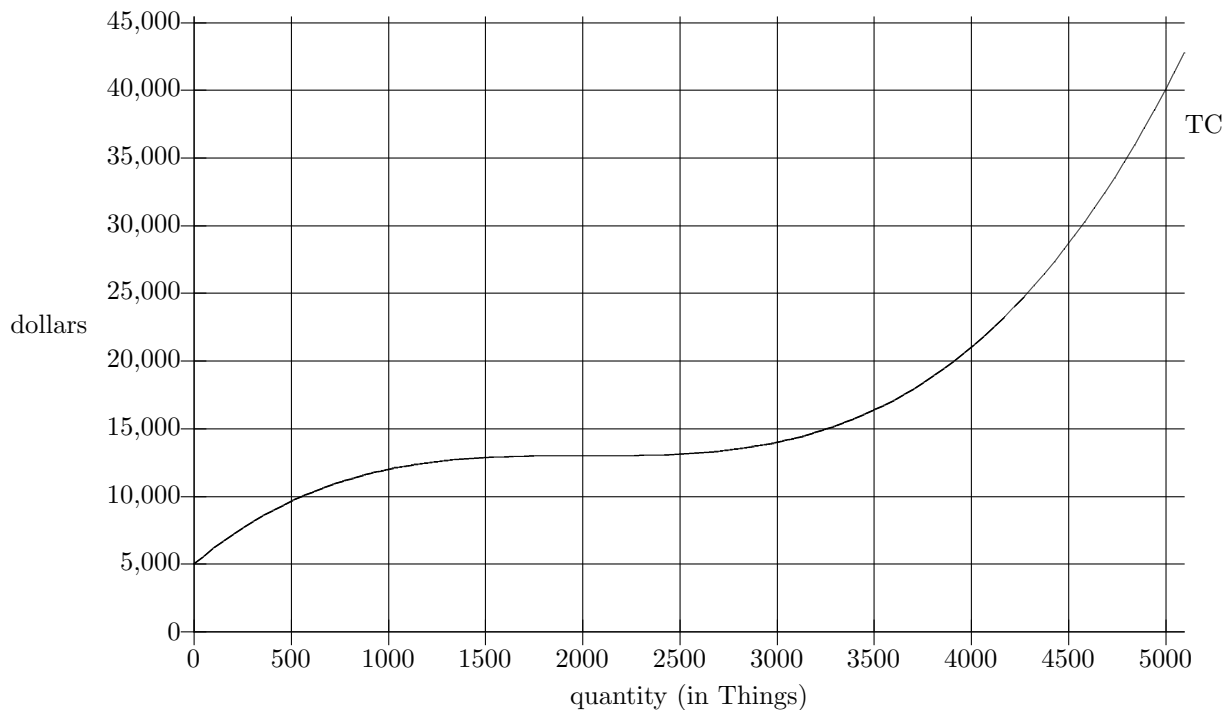
SIGNATURE: _____

1	16	
2	17	
3	17	
Total	50	

- Please check that your exam contains 3 problems.
- Please turn your cell phone OFF and put it away for the duration of the exam.
- Unless otherwise indicated, you must show your work. Clearly label lines and points that you are using and show all calculations. The correct answer with no supporting work may result in no credit.
- Put your name on your sheet of notes and turn it in with the exam.

GOOD LUCK!

1. (16 points) You produce and sell *Things*. The graph below shows your total cost (TC).



(a) What is the variable cost (VC) of producing 5000 Things?

ANSWER: \$ _____

(b) What is the smallest value of average cost (AC)?

ANSWER: \$ _____ per Thing

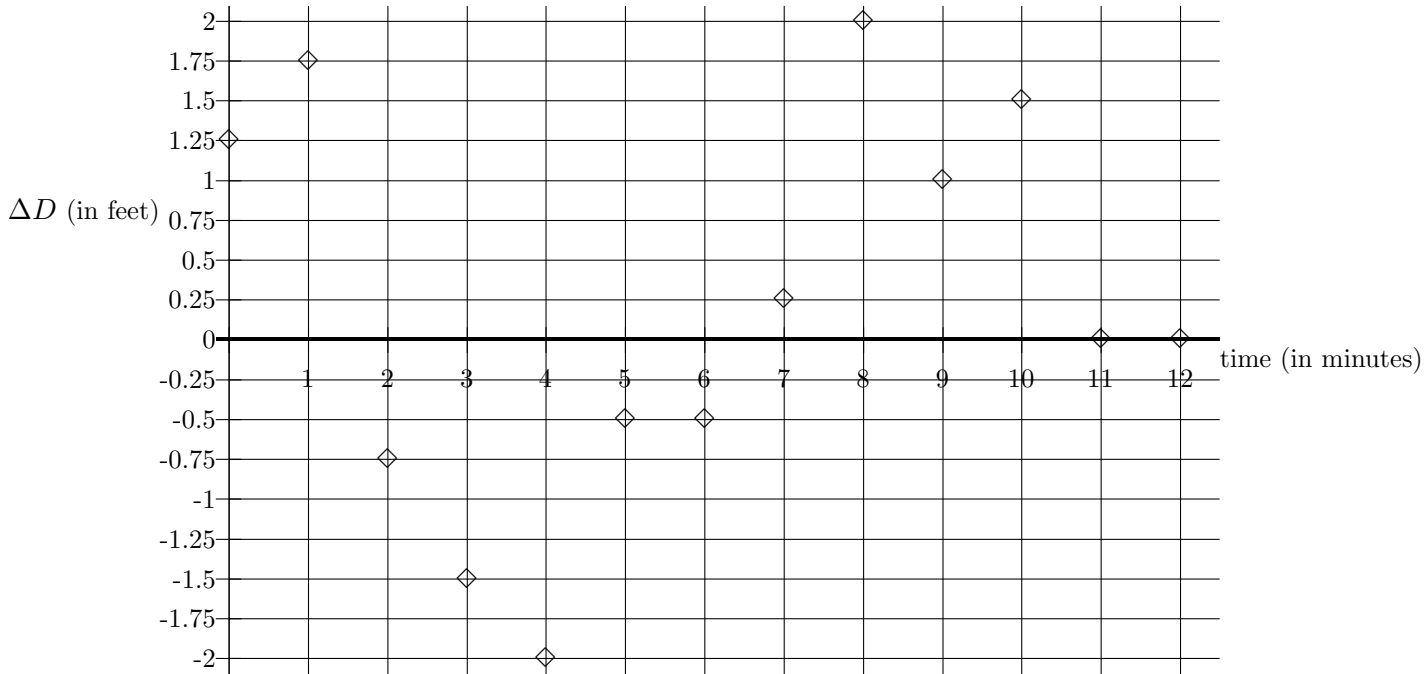
(c) Estimate the change in total cost that occurs when quantity increases from 1000 to 1001 Things.

ANSWER: \$ _____

(d) If items sell at a market price of \$6 each, name the largest quantity at which $TR = TC$.

ANSWER: $q =$ _____ Things

2. (17 points) Charlie, the friendly cat, is trying to play with Lola, the grouchy cat. When Lola looks away, Charlie quietly moves toward Lola. But when Lola notices Charlie, she moves away. Let $D(t)$ be the distance between the two cats at time t . The graph below shows the **CHANGE IN** $D(t)$ over one-minute intervals. Each data point is placed at the *beginning* of the interval. For example, the diamond at $t = 1$ shows the change in $D(t)$ over the interval from $t = 1$ to $t = 2$.



- (a) If Charlie is 3 feet away from Lola at $t = 0$, how far apart are the cats at $t = 4$?

ANSWER: _____ feet

- (b) Name the longest interval over which Charlie is getting closer to Lola.

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

- (c) When is Charlie farther from Lola, at $t = 8$ or $t = 9$? Explain.

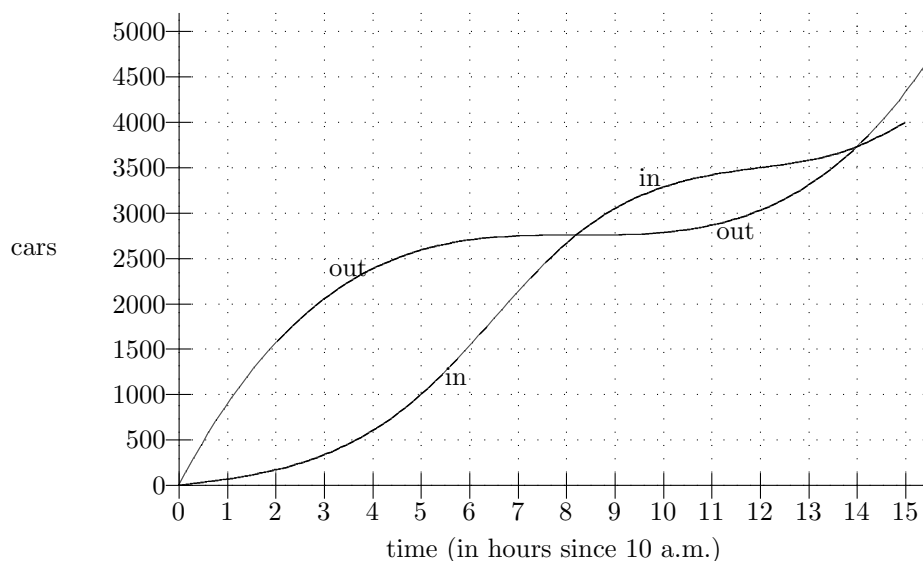
ANSWER: (circle one) $t = 8$ $t = 9$

EXPLANATION:

- (d) Compute $\frac{D(13) - D(10)}{3}$.

ANSWER: _____

3. (17 points) A counter at the gate of an airport parking lot keeps track of the number of cars that have come into the lot since 10 a.m. Another counter keeps track of the number of cars that have left the lot since 10 a.m. The two graphs below show the number that have come in and gone out over a fifteen-hour period. Let $C(t)$ represent the number of cars in the lot t hours after 10 a.m. The lot contains 2500 cars at 10 a.m. (That is, $C(0) = 2500$.)



- (a) Translate the following statement into English and then decide if it is true or false:

$$C(6) > C(7).$$

TRANSLATION:

(circle one) true false

- (b) Name the first time at which the overall rate of flow *in* is the same as the overall rate of flow *out*.

ANSWER: $t =$ _____ hours after 10 a.m.

- (c) Find a one-hour interval during which at least 500 cars entered the lot.

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

- (d) On average, how many cars left the lot per hour during the five-hour interval starting at 10 a.m.?

ANSWER: _____ cars per hour