

MATH 111  
Exam I  
January 31, 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.”

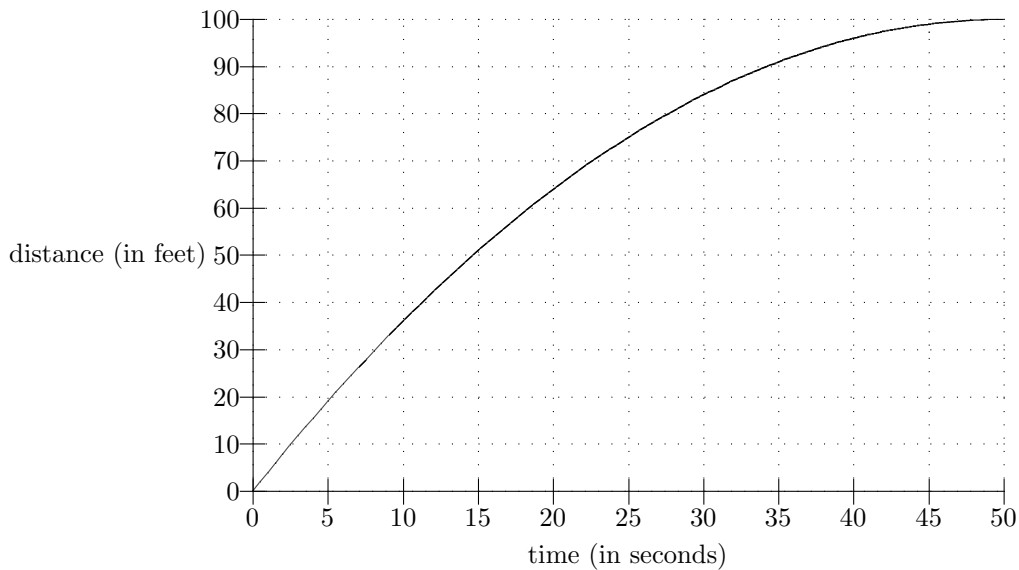
SIGNATURE: \_\_\_\_\_

1	18	
2	20	
3	12	
Total	50	

- Please check that your exam contains 3 problems on 3 pages.
- Please turn your cell phone OFF and put it away for the duration of the exam.
- Unless otherwise indicated, you must show your work. 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. (18 points) The following is the graph of distance versus time for a moving object. Let  $D(t)$  represent the distance the object has traveled in feet after  $t$  seconds.



- (a) Find the object's average trip speed after 25 seconds.

ANSWER:  $\text{ats} = \underline{\hspace{2cm}}$  feet per second

- (b) Compute the object's average speed over the interval from  $t = 10$  seconds to  $t = 35$  seconds.

ANSWER: average speed =  $\underline{\hspace{2cm}}$  feet per second

- (c) Translate the following phrase into functional notation.

*the object's average speed over the ten-second interval beginning at  $t$  seconds*

ANSWER:  $\underline{\hspace{3cm}}$

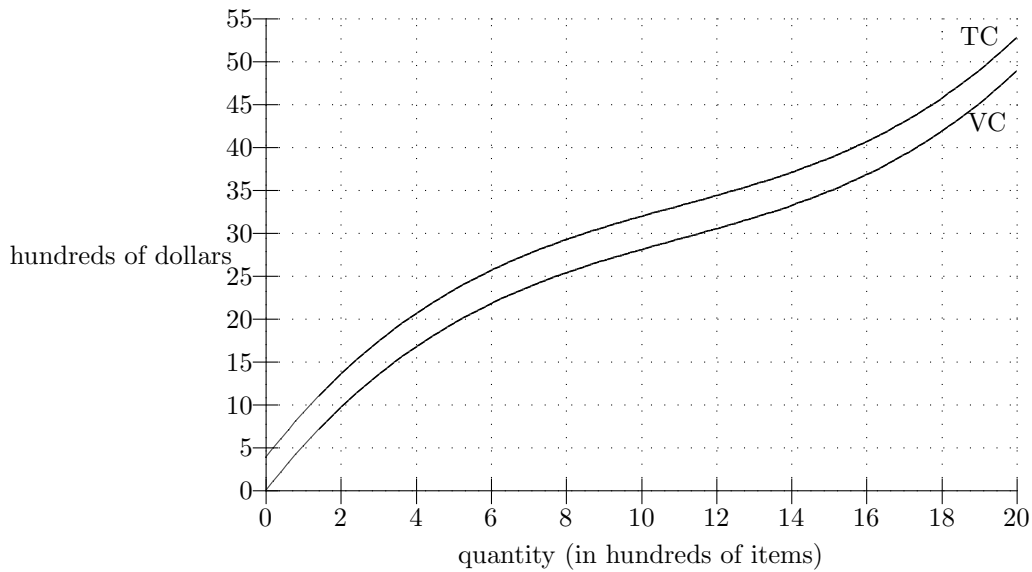
- (d) Translate the following sentence into English:  $D(25 + h) - D(25) = 13$ .

ANSWER:

- (e) Find a ten-second interval over which the object travels exactly ten feet.

ANSWER: from  $t = \underline{\hspace{2cm}}$  to  $t = \underline{\hspace{2cm}}$  seconds

2. (20 points) You sell *Items*. The graph below shows total cost ( $TC$ ) and variable cost ( $VC$ ).



(a) Every item sells for the same market price of  $p$  dollars per item. If you sell 15 hundred items, then your total revenue is 45 hundred dollars. Sketch the graph of total revenue ( $TR$ ) and compute the market price,  $p$ .

ANSWER:  $p =$  \_\_\_\_\_ dollars per item

(b) Using your  $TR$  graph from part (a), determine the quantity that will yield maximum profit.

ANSWER:  $q =$  \_\_\_\_\_ hundred items

(c) Compute the value of average cost ( $AC$ ) at  $q = 6$  hundred Items.

ANSWER: \_\_\_\_\_ dollars per item

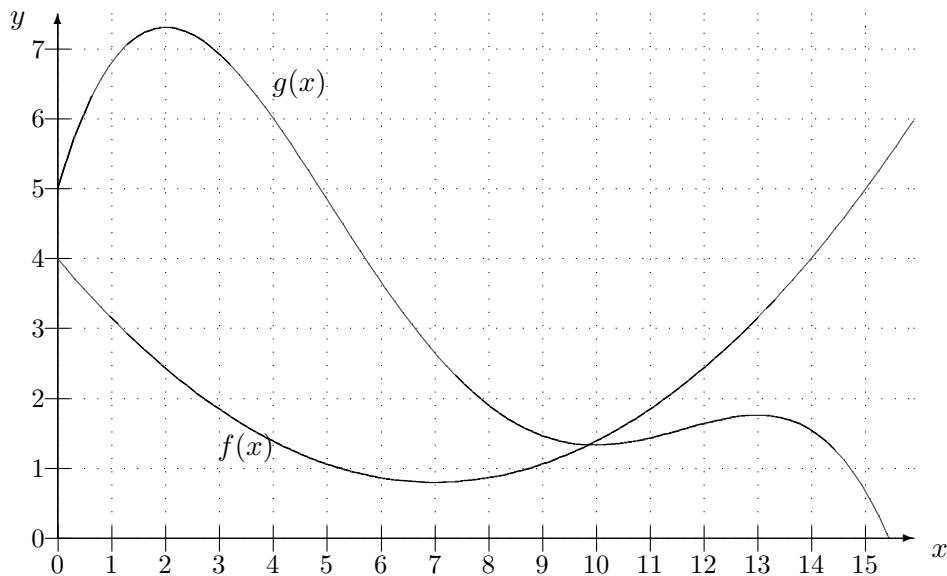
(d) Determine the shutdown price.

ANSWER: \$ \_\_\_\_\_

(e) Find the longest interval, starting at  $q = 2$  hundred items for which average variable cost ( $AVC$ ) is greater than or equal to 3.

ANSWER: from  $q = 2$  to  $q =$  \_\_\_\_\_

3. (12 points) The graphs of  $f(x)$  and  $g(x)$  are given below.



- (a) Find an interval of length 2 for which  $g(x+1) - g(x)$  is negative, then 0, then positive.

ANSWER: from  $x =$  \_\_\_\_\_ to  $x =$  \_\_\_\_\_

- (b) Find an  $x$  such that  $g(x) \geq 4$  and  $g(x) - f(x) = 4$ .

ANSWER:  $x =$  \_\_\_\_\_

- (c) Find an  $x$  such that  $\frac{f(x)}{x} = \frac{g(x)}{x}$ .

ANSWER:  $x =$  \_\_\_\_\_

- (d) Find an  $x$  such that  $\frac{f(x) - f(2)}{x - 2} = 0$ .

ANSWER:  $x =$  \_\_\_\_\_

- (e) List all values of  $x$  at which  $\frac{g(x+0.01) - g(x)}{0.01} = 0$ .

ANSWER:  $x =$  \_\_\_\_\_