

MATH 112
Exam I
April 23, 2009

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.”

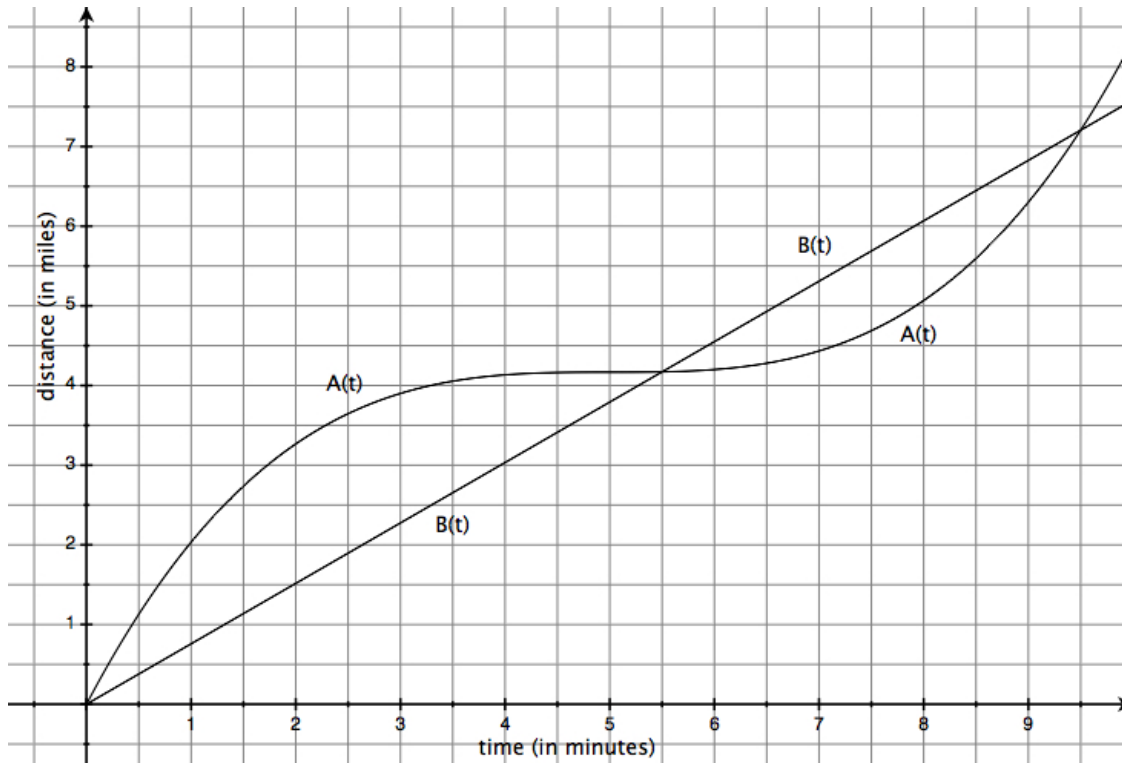
SIGNATURE: _____

1	16	
2	20	
3	14	
Total	50	

- Your exam should consist of this cover sheet, followed by FOUR pages. Please check that you have a complete exam.
- 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.
- If you use a guess-and-check method or read a value from a graph on your calculator when an algebraic method is available, you may not receive full credit.

GOOD LUCK!

1. (16 points) Below are the graphs of Distance vs. Time for two moving cars.



- (a) Compute the instantaneous speed of car A at $t = 9$ minutes.

ANSWER: _____ miles per minute

- (b) Find a value of h for which $A(1+h) - A(1) = 2$.

ANSWER: $h =$ _____

- (c) Find the longest time interval during which Car B is moving **faster** than Car A .

ANSWER: from $t =$ _____ and $t =$ _____

- (d) Describe the graph of car B 's instantaneous speed. Be as specific as possible.

2. (20 points)

(a) Let $f(x) = 3 + 4x - 2x^2$.

i. Write out a formula, in terms of h , for

$$\frac{f(4+h) - f(4)}{h}.$$

Simplify as much as possible.

ANSWER: $\frac{f(4+h) - f(4)}{h} =$ _____

ii. Use the derivative rules to find the slope of the line tangent to $f(x)$ at $x = 20$.

ANSWER: _____

THIS PROBLEM IS CONTINUED ON THE NEXT PAGE.

(b) Let $g(x)$ be a function such that

$$g(m+h) - g(m) = \frac{2h}{(1-2m-2h)(1-2m)}.$$

i. Compute $\frac{g(5.002) - g(5)}{0.002}$.

ANSWER: $\frac{g(5.002) - g(5)}{0.002} =$ _____

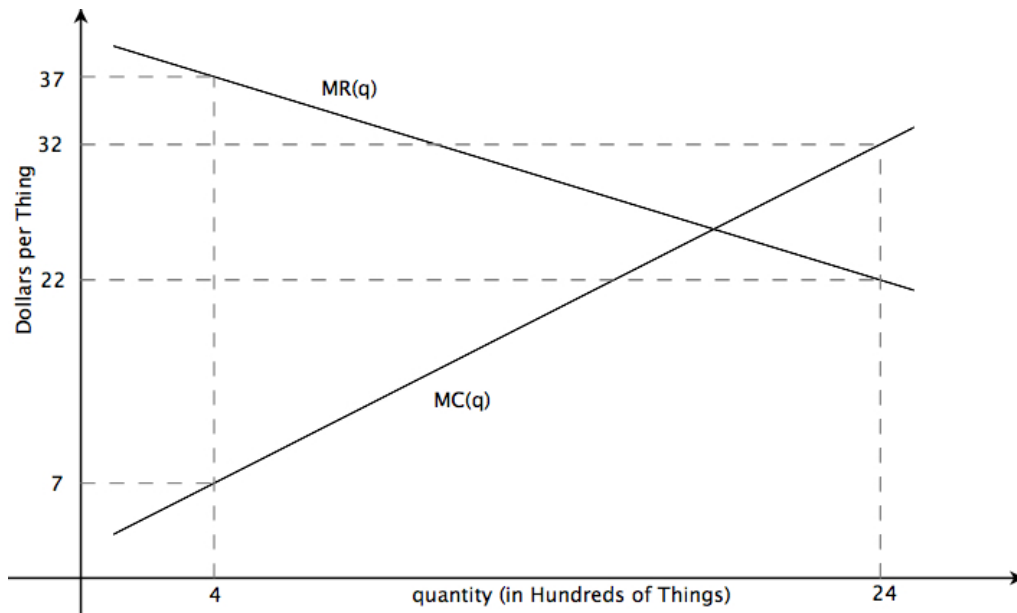
ii. Compute $g'(1)$.

ANSWER: $g'(1) =$ _____

(c) Let $h(x) = \frac{5}{4\sqrt{x}} + \frac{(3x+1)}{x} - (x^2-x)(x+1)$. Use the derivative rules to find the formula for $h'(x)$.

ANSWER: $h'(x) =$ _____

3. (14 points) Below are the graphs of marginal revenue and marginal cost for selling Things. Both $MR(q)$ and $MC(q)$ are linear functions of q .



- (a) Write out the formulas for $MR(q)$ and $MC(q)$.

ANSWERS: $MR(q) =$ _____

$MC(q) =$ _____

- (b) Find the quantity that yields the largest profit.

ANSWER: $q =$ _____ Hundred Things

- (c) Find the quantity between 10 and 15 Hundred Things that yields the largest value of **total revenue**. Explain your choice.

ANSWER: $q =$ _____ Hundred Things

- (d) Compute the cost of producing the 551st Thing. Include units with your answer.

ANSWER: _____ UNITS: _____