

MATH 112
Exam I
February 2, 2011

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	15	
2	19	
3	16	
Total	50	

- Please check that your exam contains 3 problems.
- Turn your cell phone OFF and put it away for the duration of the exam.
- You may not listen to headphones or earbuds during 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.
- You are expected to use the methods of this course. 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.
- Put your name on your sheet of notes and turn it in with the exam.

GOOD LUCK!

1. (15 points)

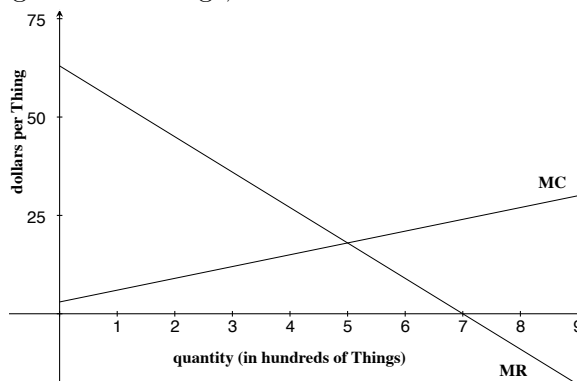
(a) Let $f(x) = 4x - 3x^2$. Compute and simplify $\frac{f(m+h) - f(m)}{h}$.

(b) Let $g(x) = \sqrt[3]{x^{14}} + \frac{5}{x^4} - (2x)^3$. Compute $g'(x)$.

(c) At right are the linear graphs of marginal cost and marginal revenue for producing and selling Things. Fill in each of the following blanks with one of the following: *increase*, *decrease*, or *stay the same*.

If quantity changes from 600 Things to 601 Things, then:

- i. Total revenue will
_____.
- ii. Total cost will
_____.
- iii. Profit will
_____.
- iv. Marginal revenue will
_____.
- v. $MC - MR$ will
_____.
- vi. MC' will
_____.



2. (19 points) You produce and sell Items. The total revenue and total cost (both in **thousands of dollars**) for producing q **thousand Items** are given by:

$$TR(q) = -q^3 + 15q^2 + 20q \text{ and } TC(q) = q^3 - 6q^2 + 17q + 5.$$

- (a) Use the derivative rules to find the formulas for marginal revenue and marginal cost.

ANSWER: $MR(q) =$ _____

$MC(q) =$ _____

- (b) Give the longest interval (starting at $q = 0$) on which TR is increasing. (HINT: It may help you to draw a rough sketch of $TR'(q)$.)

ANSWER: from $q = 0$ to $q =$ _____

- (c) What quantity maximizes profit?

ANSWER: $q =$ _____ thousand Items

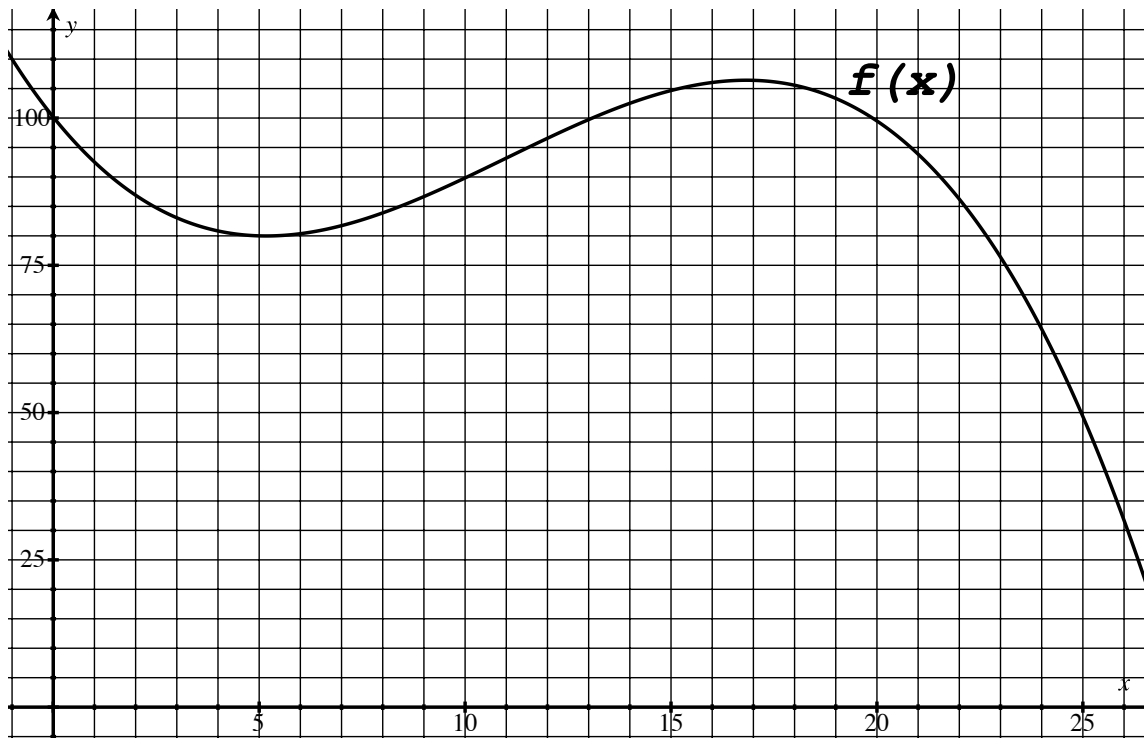
- (d) What is the smallest value of MC ? (Include units with your answer.)

ANSWER: _____; UNITS: _____

- (e) What is the cost to produce the 4,001st Item? (Include units with your answer.)

ANSWER: _____ UNITS: _____

3. (16 points) The graph below is of the function $y = f(x)$.



(a) Find a positive number h such that $\frac{f(10+h) - f(10)}{h} = 0$.

ANSWER: $h =$ _____

(b) List all values of x at which $f'(x) = 0$.

ANSWER: (list all) $x =$ _____

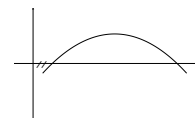
(c) Compute $f'(25)$.

ANSWER: $f'(25) =$ _____

(d) Find a value of a (other than 2) such that $f'(a) = f'(2)$.

ANSWER: $a =$ _____

(e) Give an interval over which the graph of $f'(x)$ looks like this:



ANSWER: from $x =$ _____ to $x =$ _____