MATH 112
Exam I
Spring 2018

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	12	
2	10	
3	18	
4	10	
Total	50	

- Check that your exam contains 4 problems.

- You are allowed to use a TI-30XIIS calculator, a ruler, and one sheet of hand-written notes. All other sources are forbidden.

- Do not use scratch paper. If you need more room, use the back of the page and indicate to the grader you have done so.

- 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.

- 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 when an algebraic method is available, you may not receive full credit.

- When rounding is necessary, you may round your final answer to two digits after the decimal.

- There are multiple versions of the exam, you have signed an honor statement, and cheating is a hassle for everyone involved. DO NOT CHEAT.

- Put your name on your sheet of notes and turn it in with the exam.

GOOD LUCK!

1. (12 points)

    (a) Compute the indicated derivative. DO NOT SIMPLIFY.

        i. $y = \left(\dfrac{1}{x^3} - 2x^6 \right)^5$

          $\dfrac{dy}{dx} =$

        ii. $g(x) = \sqrt{x}\left(x^4 + x^3 + x^2 \right)$

          $g'(x) =$

    (b) Suppose the demand function for q units of an appliance priced at \$$p$ per unit is given by

    $$p = \frac{100(q + 2)}{(q + 3)^2}.$$

    Find the rate of change of price with respect to the number of appliances.
    DO NOT SIMPLIFY.

    (c) Suppose Total Cost to produce q Items is $TC(q) = 2q^3 - 240q^2 + 9601q + 500$ dollars. Find the quantity q at which $MC'(q) = 396$.

    ANSWER: $q =$ _____ Items

2. (10 points) Suppose $f(x) = -\dfrac{1}{3}x^3 + x^2 + 9x + 13$ and $g(x) = 9x - x^2$.

   (a) Find the value of x at which $f'(x)$ is highest.

   ANSWER: $x = $_____

   (b) Find all values at which the tangent line to $f(x)$ is parallel to the tangent to $g(x)$.
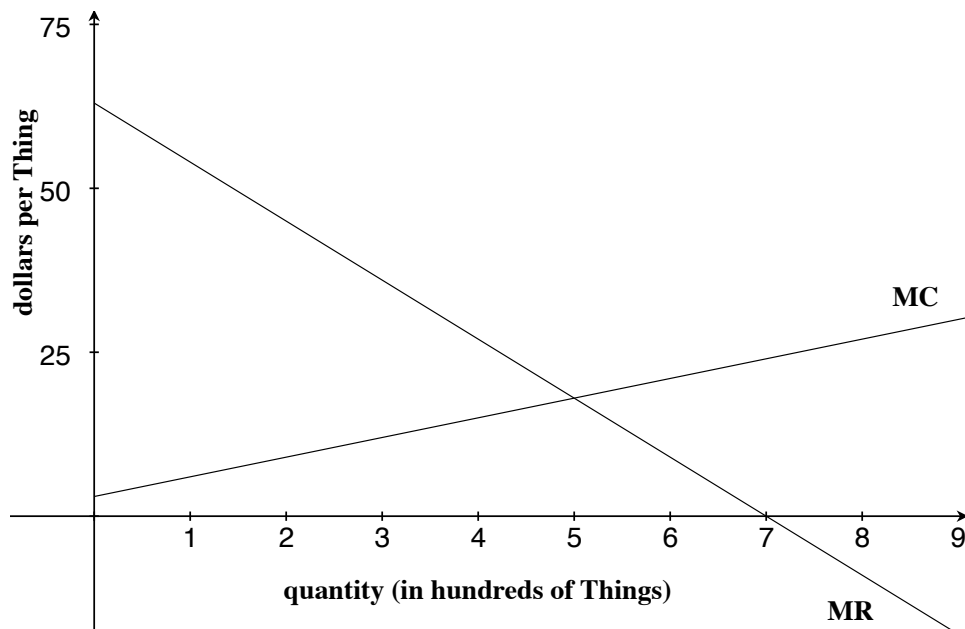
   ANSWER: (list all) $x = $_____

   (c) Compute and simplify $\dfrac{g(m+h) - g(m)}{h}$.

   ANSWER: $\dfrac{g(m+h) - g(m)}{h} = $_____

YOU DO NOT NEED TO SHOW ANY WORK ON THIS PROBLEM.

3. (18 points) Below are the linear graphs of marginal cost and marginal revenue for producing and selling Things.


(a) 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_____.

(b) What quantity gives the largest Total Revenue?

ANSWER: $q =$_____hundred Things

(c) What quantity gives the largest Profit?

ANSWER: $q =$_____hundred Things

(d) What quantity gives the smallest Total Cost?

ANSWER: $q =$_____hundred Things

4. (10 points) Below are the graphs of Total Revenue and Total Cost for producing Objects. Notice the units on the axes.

quantity (in thousands of Objects)
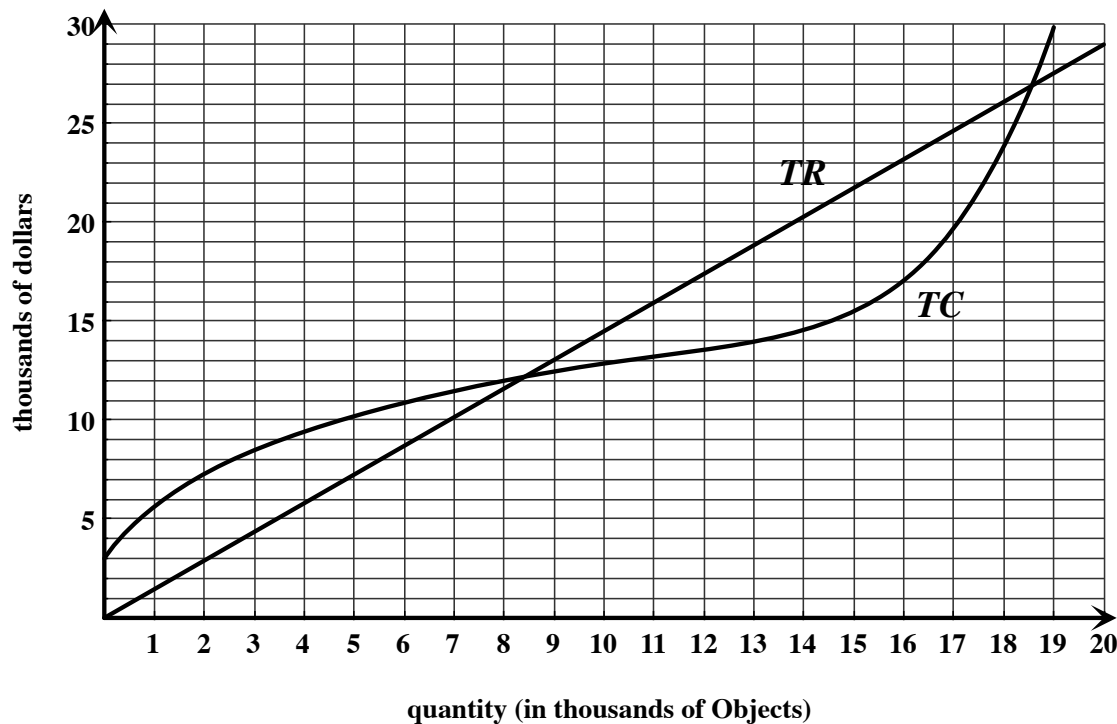
(a) Draw an appropriate tangent line and compute its slope to find the Marginal Cost at a production level of 13,000 Objects.

ANSWER: _____dollars

(b) Describe what the graph of **Marginal Revenue** looks like. Be as specific as possible.

(c) List all quantities at which **Profit** is 0.

ANSWER: (list all) $q =$_____thousand Objects

(d) List all quantities at which **Marginal Profit** is 0.

ANSWER: (list all) $q =$_____thousand Objects

(e) Give the largest interval on which **Profit** is **positive** and **increasing**.

ANSWER: from $q =$_____to $q =$_____thousand Objects