↑↑ Last Name ↑↑ , ↑↑ First Name ↑↑

Math 163A Homework Set #3

Due Friday, April 25, 2008

Problem:	1	2	3	4	5	Total
Score:						
Possible:	5	5	5	5	5	25

[1] (based on suggested problems 3.3#1,3,5,7)

Find the average rate of change of $f(x)=\dfrac{x-1}{x-2}$ between $x = 3$ and $x = 5$. Show your work and simplify your answer.

[2] (based on suggested problems 3.3#1,3,9 and concepts from Sections 3.3 and 3.4) Let $f(x)=x^2+2x-3$.

(a) Find the average rate of change of f between $x = -2$ and $x = 2$. Show your work.
(b) Find the instantaneous rate of change of f at $x = -2$. Show your work.
(c) Draw a graph of f on the interval $-5 \le x \le 3$. Make your graph large and neat, and be sure to put coordinates on all these key points:

- all axis intercepts
- the vertex
- the endpoints

(Hint: It will help to note that f can be rewritten $f(x)=x^2+2x-3=(x+3)(x-1)=(x+1)^2-4$.)

(d) The average rate of change that you found in part (a) can be interpreted as the slope *m* of a line that can be drawn on the graph of f. Draw the line on your graph from (c).
(e) The instantaneous rate of change that you found in part (b) can be interpreted as the slope *m* of another line that can be drawn on the graph of f. Draw the line on your graph from (c).

[3] (based on suggested problems 3.3#27 and 3.4#47)

Suppose that the revenue from selling *x* furnaces is $R(x)=10,000x-2x^2$.

(a) Find the average rate of change of revenue when *x* changes from 1000 to 1001.
(b) Find the instantaneous rate of change of revenue when 1000 furnaces are sold. (This number is called the *marginal revenue at x = 1000*.)
(c) Find the additional revenue brought in by selling the 1001st furnace. That is find $R(1001)-R(1000)$.
(d) Compare your answers to parts (a), (b), and (c). What do you find?
(Hint: Do not round your numbers! This will be especially important for part (d).)

[4] (based on suggested problem 3.4#13)

Let $f(x)=\dfrac{7}{x}$. The goal is to use the definition of the derivative to find $f'(x)$.

(a) Find $f(x+h)$.
(b) Find $f(x+h)-f(x)$. Find a common denominator & simplify your answer. Show your work.
(c) Find $\dfrac{f(x+h)-f(x)}{h}$. Simplify your answer. Show your work.
(d) Find $f'(x)=\lim\limits_{h\to 0}\dfrac{f(x+h)-f(x)}{h}$. Simplify your answer. Show your work.

[5] (based on suggested problem 3.4#2 and #4 and concepts from class and the reading)

(a) Suppose that the line tangent to the graph of f at $x = 3$ is vertical. What is $f'(3)$? Explain.
(b) Suppose that the line tangent to the graph of f at $x = 3$ is horizontal. What is $f'(3)$? Explain.