Math 120 - Fall 2008
Exam 1
October 16, 2008

Name: _____

Section: _____

Student ID Number: _____

1	10	
2	10	
3	10	
4	10	
5	10	
Total	50	

- You are allowed to use a scientific calculator (**NO GRAPHING CALCULATORS**) and one **hand-written** 8.5 by 11 inch page of notes. Put your name on your sheet of notes and turn it in with the exam.

- Check that your exam contains all the problems listed above.

- You must show your work on all problems. The correct answer with no supporting work may result in no credit. Unless otherwise indicated, your **final answer** must be correct to two digits after the decimal.

- Guess and check methods are not sufficient, you must use appropriate methods from class.

- If you need more room, use the backs of the pages and indicate to the grader that you have done so.

- Raise your hand if you have a question.

- There are multiple versions of the exam. Any student found engaging in academic misconduct will receive a score of 0 on this exam (we take this very seriously, if you are found cheating you will at least get academic probation or you may be expelled from school).

- You have 50 minutes to complete the exam.
  START BY LOOKING THROUGH ALL THE PROBLEMS AND USE YOUR TIME WISELY.
  Check your time after you complete each problem and manage your time accordingly. Remember that significant partial credit may be given to correct work, so show me what you know!

GOOD LUCK!

1. (10 points) The (average) monthly rent for an apartment in Funtown and Boreville is tabulated below:

YEAR	FUNTOWN	BOREVILLE
1960	$100	$150
1990	$400	$210

Let x = the year, $f(x)$ = the rent in Funtown and $g(x)$ = the rent in Boreville. Assume that the average rents for Funtown and Boreville (*i.e.* $f(x)$ and $g(x)$) are **linear functions** of the year x.

Find the linear functions and answer the following question: For what value of x will it cost $500 more on average to rent in Funtown than in Boreville? (leave your answer as a decimal)

2. (10 points)

Danny has 950 feet of fencing to make a rectangular enclosure with two parallel interior fences that divide the enclosure into three regions as show. What dimensions will maximize the area of the enclosure?
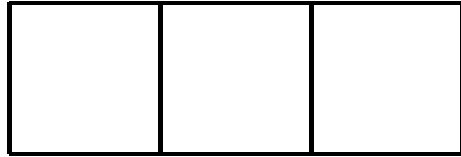
3. (10 points) Let $f(x) = x^2 + 4x$ and $g(x) = 10x^2 + bx + 8$ for some number b.

   (a) Simplify the expression $\dfrac{f(2) - f(2-h) + 2f(h)}{h}$.

   (b) Find the x and y coordinates of the vertex of $f(x)$ and answer the following question:
   If the vertex for $f(x)$ and $g(x)$ have the same x-coordinate, what is the value of b?

4. (10 points) A certain radio station broadcast can be picked up by any radio within a radius of 10 miles. George gets on his bike at a location 2 miles north and 3 miles west of the radio station and he puts on his radio headphones. George travels due east at 10 miles/hour for 30 minutes and then he turns due south continuing at 10 miles/hour. Let $t =$ the time in *hours* since George started biking.

At what time, t, will George no longer be able to receive the radio broadcast? (That is, when does he leave the circular broadcast region?)
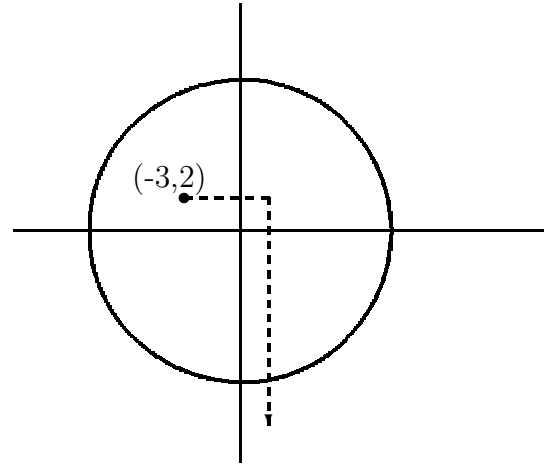
5. (10 points) The graphs below shows two line segments one from (0,0) to (2,6) and the other from (2,6) to (5,0). For a value of x, with $0 \leq x \leq 5$, the corresponding y value represents the height from the x-axis to the line segment, as depicted below.
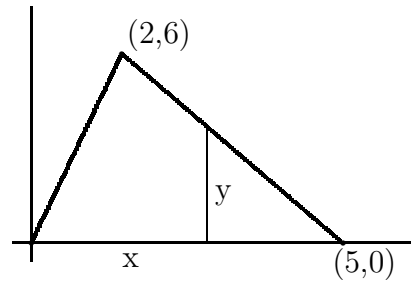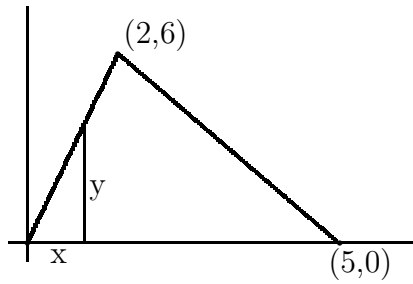
(a) Find the multipart rule for the height, y, in terms of x for $0 \leq x \leq 5$.

(b) If a vertical line is drawn (as shown) at x (where $0 \leq x \leq 5$), give the multipart rule, in terms of x, for the area of the region to the left of x and bounded by the line segments and the x-axis.

(Hint: I am asking you to find the area formula like you did in the homework.)