Math 120 - Fall 2007
Exam 1
October 18, 2007

Name: ______________________________

Section: ______________________________

Student ID Number: ______________________________

TA's Name: ______________________________

1	10	
2	8	
3	12	
4	10	
5	10	
Total	50	

- You are allowed to use a calculator 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.
- 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.
- You have 50 minutes to complete the exam. The third question will likely require the most computation, so make sure to leave time to complete 4 and 5.

GOOD LUCK!

1. (10 points) In 1980, the population of Mongo was 18,000. In 1995, the population of Mongo was 20,000. Assume that the population of Mongo grows according to linear models.

   The population of the city of Parn is given by

   $$P(x) = 200x - 331200,$$

   where x is the year (for example, the population of Parn in 1990 is P(1990) $=$ 66800.)

   For what value of x will the population of Parn be triple the population of Mongo?

2. (8 points)

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

$$\frac{f(2x+h) - f(2x)}{h}$$

and simplify as much as possible (assume $h \neq 0$).

(b) If $g(x) = 3x + 1$, $h(x) = 7x + b$, and $h(g(x)) = 21x - 2$,

then what is the value of b.

3. (12 points) Assume a cell phone tower on top of Mount Rainier gives cell phone coverage to anyone at or within a 5 mile radius of the tower. In the morning, Danny is 7 miles south and 2 miles west of the tower. Then Danny hikes at a constant speed of 6 miles per hour on a straight line through the northernmost point of the coverage area.

   During Danny's hike, how long (in hours) was he within the cell phone tower coverage area?

4. (10 points) Bill sells liters of juice using a sliding price scale.

   If he sells 4 liters, then the price is \$7.50 per liter, which gives a total sale of \$30.00.

   If he sells 8 liters, then the price is \$6.75 per liter, which gives a total sale of \$54.00.

   The **price per liter** is a linear function of the **liters sold**.

   (a) Give the quadratic model for the **total sale**?

   (b) How many liters of juice should Bill sell to maximize his **total sale**?

5. (10 points) Consider the multipart function $f(x) = \begin{cases} 3x+1 & \text{, if } x < 2; \\ x+10 & \text{, if } x \geq 2. \end{cases}$

(a) Compute $f(-1)$.

(b) Find all solutions to the equation $f(x) = 5$.

(c) Give the multipart rule for $3f(2x+1)$.