

**Math 111**  
**Exam 1**  
**October 19th, 2007**

Name: \_\_\_\_\_

1. Your exam contains 5 questions and 5 pages; Please make sure you have a complete exam.
2. The entire exam is worth 100 points. Point values vary and these are indicated on each problem. You have 50 minutes for this exam.
3. Make sure to **ALWAYS SHOW YOUR WORK**; you will not receive any partial credit unless all work is clearly shown. If in doubt, ask for clarification.
4. If you need extra space, use the back of the exam and clearly indicate this.
5. You are allowed one  $3 \times 5$  notecard of handwritten notes (both sides). Graphing and scientific calculators are allowed.
6. Leave answers in exact form (as simplified as possible) or round to 4 decimal places.

Problem	Total Points	Score
1	32	
2	15	
3	15	
4	16	
5	22	
Total	100	

1. (32 pts.) You sell “I ♥ Linear Functions” t-shirts and you begin to keep track of your daily sales. You notice that you sell 420 shirts if the price for each shirt is \$8. You sell 308 t-shirts if the price is \$12 each. Let  $p$  = the price of each shirt and  $q$  = the quantity sold in one day.

(a) (12 pts.) Find a formula for  $q$  in terms of  $p$  assuming that  $q$  is a **linear** function of  $p$ , i.e.,  $q = f(p)$ .

(b) (5 pts.) How many shirts will you sell if the price is \$15?

(c) (7 pts.) Solve  $f(p) = 490$  and interpret this in terms of  $p$  and  $q$ .

(d) (8 pts.) Find the inverse function  $p = f^{-1}(q)$ .

Note: If you do not have a function from part (a), please use  $q = -36p + 688$  in parts (b)-(d).

2. (15 pts.) Consider the two functions  $f(x) = 3x + 1$  and  $g(x) = -x^3 + 5$ .

(a) (6 pts.) Find  $f(g(2))$ .

(b) (9 pts.) Find  $f(g(x))$ . Simplify as much as possible.

3. (15 pts.)

(a) (7 pts.) What is the domain of the function  $g(x) = \sqrt{3x + 12}$ ?

(b) (8 pts.) What is the range of the function  $h(x) = 3x - 2$  with domain  $-2 \leq x < 6$ ? (Hint: Consider the graph of  $h$ .)

4. (16 pts.) Write an equation of a line that intersects the  $x$ -axis at  $x = 3$  and is perpendicular to the line  $y = \frac{1}{3}x + 4$ .

5. (22 pts.) Consider the function  $f(x) = 3x^2 - 2x - 3$ .

(a) (12 pts.) Find all of the points on the graph of  $f$  whose  $y$ -coordinates are 5.

(b) (10 pts.) Find the rate of change of  $f$  between  $x = 0$  and  $x = 2$ .