

**Math 111**  
**Exam 1**  
**April 23rd, 2010**

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

1. Your exam contains 6 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. Put a box around your final answer where applicable.
5. Leave answers in exact form (as simplified as possible) or round to 4 decimal places.
6. You are allowed one 3" × 5" notecard for handwritten notes (both sides).
7. You may use a calculator for this exam, but I will not give credit for work done solely on a calculator (aside from arithmetic).
8. If you need extra space, use the back of the exam and clearly indicate this.

Problem	Total Points	Score
1	18	
2	15	
3	16	
4	12	
5	20	
6	19	
Total	100	

1. (18 pts.) Suppose your salary at time 0 (year 2000) was \$30,000 and your salary at time 5 (year 2005) was \$34,000. Assume your salary grows at a **constant** rate.

(a) (10 pts.) Find a formula for salary,  $S$ , given that  $S$  is a linear function of time  $t$ .

(b) (8 pts.) Given the formula above, when will your salary be \$50,000?

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2. (15 pts.) Consider the function  $f(x) = \frac{12}{x(x-1)}$ .

(a) (6 pts.) What is the domain of  $f(x)$ ?

(b) (9 pts.) Find the rate of change of  $f(x)$  between  $x = 2$  and  $x = 4$ .

3. (16 pts.) The distance travelled (in inches) by a snail at time  $t$  (in seconds) is given by the function
- $$D = f(t) = 3(\sqrt[4]{t}).$$

(a) (5 pts.) How far will the snail have travelled after 16 seconds? Include units in your answer.

(b) (5 pts.) When will the snail have travelled 1 **foot**? Include units in your answer.

(c) (6 pts.) Find the inverse function  $t = f^{-1}(D)$ .

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4. (12 pts.) Consider the functions  $g(x) = 4x^2 - 4x - 1$  and  $h(x) = \sqrt{x + 10}$ .

(a) (6 pts.) Find  $h(g(1))$ .

(b) (6 pts.) Find  $h(g(x))$  and simplify as much as possible.

5. (20 pts.) Consider the function  $g(x) = 4x^2 - 4x - 1$ .

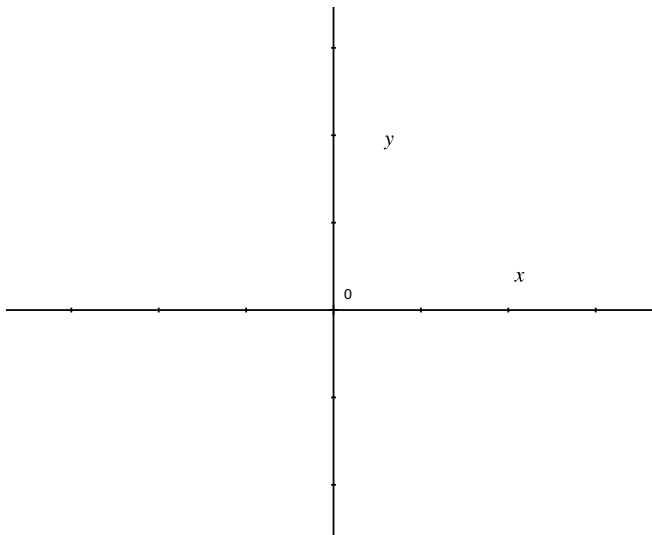
(a) (4 pts.) Is  $g(x)$  concave up or down?

(b) (6 pts.) Find all of the **points** on the graph of  $g(x)$  whose  $x$ -coordinates are 2.

(c) (10 pts.) Solve the equation  $g(x) = 2$ . Simplify your solutions as much as possible.

6. (19 pts.) Consider the piecewise defined function  $H(x) = \begin{cases} x^2 & \text{if } x < 0 \\ x - 1 & \text{if } x \geq 0 \end{cases}$ .

(a) (8 pts.) Neatly sketch  $H(x)$  below. Put a scale on your axes.



(b) (7 pts.) Find **all**  $x$ -values for which  $H(x) = 4$ .

(c) (4 pts.) What is the range of  $H(x)$ ?