Math 110
Final Exam - Version 1
Fall 2007

Name: _____

1. Your exam contains 11 questions and 6 pages; Please make sure you have a complete exam.
2. The entire exam is worth 50 points. Point values for problems vary and these are clearly indicated. 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 page and clearly indicate this.
5. You are allowed one 8.5×11 sheet of handwritten notes (both sides). Graphing and scientific calculators are allowed.

Problem	Total Points	Score
1	17	
2	8	
3	15	
4	6	
5	7	
6	8	
7	8	
8	4	
9	5	
10	10	
11	12	
Total	100	

1. Let $f(x) = 3x^2 - 12x + 1$.

(a) (5 points) What is the average rate of change of $f(x)$ from $x = 1$ to $x = 4$?

(b) (7 points) What is the average rate of change of $f(x)$ from $x = a$ to $x = a + h$?

(c) (5 points) What is the minimum value of $f(x)$?

2. (8 points) Write the function $g(x)$ whose graph starts as the graph of $f(x) = |x|$, then is shifted 2 units to the left, reflected over the x-axis, and shifted 3 units down.

3. (5 points each) Let $f(x) = x^3 - 2x$ and $g(x) = 3x$. Find:

(a) $(f + g)(1)$

(b) $(fg)(x)$. (Simplify your answer.)

(c) $(f \circ g)(1)$

4. (6 points) Find functions $f(x)$ and $g(x)$ to express the function $h(x) = \sqrt{x^3 - 2}$ as a composition $(f \circ g)(x)$. (There is more than one correct answer.)

5. (7 points) Let $g(x) = 3x^5 + 2$. Find $g^{-1}(x)$.

6. (8 points) Divide, *using synthetic division*, and express your answer in the form $\frac{P(x)}{Q(x)} + R(x)$:
$3x^3 - x + 20 \div x + 2$.

7. (8 points) State all asymptotes of the rational expression $\frac{x+4}{x-4x+12}$.

8. (4 points) Find the value of the following expression, rounded to 4 decimal places: $\log_6 20$ (Even though you'll need your calculator, don't forget to write down your work.)

9. (5 points) Suppose a radioactive element has a half-life of 20 days. Give a formula $m(t)$ which gives the remaining mass of a 100 mg sample after t days.

10. You invest \$800 in an account at an interest rate of 5%, compounded *continuously*.

(a) (4 points) How much money will be in the account in 3 years?

(b) (6 points) How long will it take for the investment to double?

11. (6 points each) Solve:

(a) $6^{x+2} - 4 = 20$

(b) $3\log(x - 2) = 3000$