MAT 121 Test 4 - Fall, 2014 Name_____
70 Points Covers Chapter 4

1. (15 pts) Starting with $f(x)=\log_3(x)$, sketch the graph of $g(x)=4\cdot\log_3(x+2)-3$ in 4 steps (counting $f(x)=\log_3(x)$ as the first step). Use $x=\frac{1}{3}$, x = 1, and x = 3 to find 3 points in the first graph, and show how these 3 points are moved around by each step in the transformation to $g(x)$. Finding the *x*- and *y*-intercepts is a separate problem, so don't worry about them, on this page.

2. Let $f(x)=\sqrt{2x+4}$ and $g(x)=\dfrac{x-2}{x-7}$.

a. (5 pts) What is the domain of f?

b. (5 pts) What is the domain of g?

c. (5 pts) Write the function $\dfrac{f}{g}$. Do not simplify.

d. (5 pts) Write the function $f \circ g$. Do not simplify.

e. (10 pts) What is the domain of $\dfrac{f}{g}$?

3. (5 pts) Let $g(x)=4\cdot\log_3(x+2)-3$. Find the *x*- and *y*-intercepts for this function, rounded to 4 decimal places. For 5 **bonus** points, label these intercepts on your final graph on page 1.

4. Find the domain:

   a. (5 pts) $\sqrt{\dfrac{(x-5)^2(x-11)^3}{(x+1)^5(x+3)}}$

   b. (5 pts) $\log_3\left(\dfrac{(x-5)^2(x-11)^3}{(x+1)^5(x+3)}\right)$ (Reinterpret previous work and write the answer.

5. (5 pts) Solve $\log(x-7)+\log(x+2)=1$

6. (5 pts) Solve $3^{x^2-8}\cdot 3^{-3x}=9$

Solve any two (2) Bonus problems for up to 10 points. I'll grade the first two I come to.

1. BONUS (5 pts) Solve the absolute value inequality $|2x-7|<8$

2. **BONUS** (5 pts) Find the inverse function for $f(x)=\sqrt{2x+8}+11$. Then state the domain and range for both f and f^{-1}.

3. BONUS (5 pts) Re-write the function $g(x)=3x^2+6x-19$ in the form $g(x)=a(x-h)^2+k$. State the vertex of this parabola.

4. BONUS (5 pts) Write the formula for the piecewise-defined function shown on the right.

This is the picture for **Bonus #4**