MAT 121-G11 Test 4 – Spring, 2017 Name_____
100 Points Covers Chapter 4 NO GRAPHING CALCULATORS!!!

Leave a margin at the top. Write DARK. A couple borderline papers, last time, that won't get credit if they're as faint, this time.

1. (20 pts) Starting with $f(x)=4^x$, sketch the graph of $g(x)=-5\cdot 4^{3x-21}+2$ in 5 steps (counting $f(x)=4^x$ as the first step). Use $x=-1, x=0$, and $x=1$ to find 3 points in the first graph, and show how these 3 points are moved around by each step in the transformation to $g(x)$.

2. (10 pts) Find the *exact* *x*- and *y*-intercepts for $g(x)$ from #1.

   a. *x*-intercept: *A* =

   b. *y*-intercept: *B* =

Label your final graph for #1 with the intercepts labeled with *A* and *B*.

3. (5 pts) Find the inverse, $g^{-1}(x)$, for $g(x)$ in #1. The moves are very similar to what you did in #2a.

4. Let $f(x)=\sqrt{x+5}$ and $g(x)=x^2-3x-5$.

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

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

   c. (5 pts) Determine $\left(\frac{f}{g}\right)(x)$. (Sometimes just called $\frac{f}{g}$ in the text.). Do not simplify.

   d. (5 pts) What is the domain of $\left(\frac{f}{g}\right)(x)$? Leave your answer in simplified radical form.

   e. (5 pts) Determine $(f\circ g)(x)$ (Again, sometimes just called $f\circ g$). Simplify.

   f. (5 pts) What is the domain of $f\circ g$?

5. (5 pts) What is the domain of $\sqrt{\frac{(x+3)(x-5)^2}{(x-4)^3(x+8)}}$?

6. (5 pts) What is the domain of $\log_7\left(\frac{(x+3)(x-5)^2}{(x-4)^3(x+8)}\right)$?

7. (10 pts) Let $f(x)=4^{4x+7}-6$. Find $f^{-1}(x)$.

8. (10 pts) Solve $\ln(x-5)+\ln(x+2)=\ln(18)$.

9. Suppose the half-life of C-14 is 5400 years. (It isn't, quite, but just suppose…).

   a. (10 pts) Derive the exponential decay model, $A(t)=A_0e^{kt}$. The trick is to use the half-life to find the relative decay rate, *k*.

   b. (5 pts) How old is a sample of charcoal from a prehistoric fire pit, if 28% of the C-14 has decayed (i.e., 72% is left.) ? Round to the nearest year in your final answer. If it makes it easier for you, use an initial mass of 100 g of and a final mass of 72 g. It's all the same.

Bonus Answer up to three (3) 5-pointers. That's a total of 15 bonus points possible.

B 1 (5 pts) Solve the absolute value inequality: $|-5x+8|-11>-2$

B 2 (5 pts) Re-write $f(x)=5x^2-3x+1$ in the form $a(x-h)^2+k$.

B 3 (5 pts) Solve the exponential equation $3\cdot(7.7)^x=11\cdot(2.1)^x$

B 4 John can finish a job in 5 hours that it takes Bill 8 hours to finish. Suppose Bill shows up and starts working 2 hours before John shows up, and then they work together until the job is done. How many hours does each of the two end up working?

B 5 What is the future value of $5,000 in 10 years, if interest is 4%, compounded weekly? (52 weeks in a year.).

B 6 What is the present value of $5,000 in 10 years, if interest is 4%, compounded weekly?