

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 $f(x)=3^x$, sketch the graph of $g(x)=-2\cdot 3^{2x-14}+3$ in 5 steps (counting $f(x)=3^x$ 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. That means no decimal approximations.
 - 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 $f(x)=\sqrt{x+11}$ and $g(x)=x^2+2x-35$.
 - 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 $\sqrt{\frac{(x-3)^2(x+5)}{(x-4)(x+8)^2}}$?

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

7. (10 pts) Solve $\ln(x-4)+\ln(x+3)=\ln(8)$. Give an exact solution, then round to 3 decimal places.

8. Suppose the half-life of C-14 is 6000 years. (It isn't, quite, but just suppose...).
- (10 pts) Derive the exponential decay model, $A(t) = A_0 e^{kt}$. The trick is to use the half-life to find the relative decay rate, k .
 - (5 pts) How old is a sample of charcoal from a prehistoric fire pit, if 30% of the C-14 has decayed (i.e., 70% 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 70 g. It's the same thing.

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 $f(x) = 2x^2 - 3x + 1$ in the form $a(x - h)^2 + k$.

B 3 (5 pts) Solve the exponential equation $4 \cdot 7^x = 11 \cdot 2^x$.

B 4 What is the future value of \$5,000 in 9 years, if interest is 7%, compounded daily? (Use 360 days in a banker's year.).

B 5 What is the present value of \$5,000 in 9 years, if interest is 7%, compounded daily?

B 6 Sketch the graph of $g(x) = -2 \cdot \log_3(2x - 14) + 3$. (Same exact moves as #1. Different basic function.).