MAT 1340 Week 10 Written Assignment
60 points Covers Sections 4.1 – 4.3

4.1 – Exponential Functions
4.2 – The Natural Exponential Function (and the number '*e*.'
4.3 – Logarithmic Functions (The Inverse of Exponential Funcions)

1. (10 pts) Starting with $f(x)=4^x$, sketch the graph of $g(x)=-3\cdot 4^{5x-25}$ in 5 steps, counting the graph of $f(x)$ 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 transformations to $g(x)$.

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

3. (10 pts) Find the inverse, $g^{-1}(x)$ for $g(x)$ in #1.

4. (10 pts) Solve $\ln(x-5)+\ln(x+2)=\ln(18)$. Give an exact answer and then round to 3 decimal places.

5. Suppose the half-life of C-14 is 5400 years.

   a. (5 pts) Derive the exponential decay model, $A(t)=A_0e^{kt}$ for Carbon-14.

   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 100g of C-14, but you shouldn't need the mass.

6. (10 pts) Sketch the graph of $g(x)=-4\log_3(3x+21)+2$ by transforming the graph of $f(x)=\log_3(x)$. Track the points $\left(\frac{1}{3},-1\right),(1,0),$ and $(3,1)$ as they are moved from one place to another and another and another and another....