Math Chapter 4 Problems$_{S}ilvaAndrew$

asilva14

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1 Exponential Functions

Write an exponential model using $f(x) = ab^x$.
8) $f(x) = (6,000)(1.012)^x$
I found this one easy. It is just plugging in the initial population for a then just remembering that $b = 1 \pm r$ or the rate of change. Important to note that it is $\pm$ depending on whether or not it is increasing or decreasing.

Find a formula for an exponential function passing through.
13) (0,6) , (3,750)
$f(0) = 6$ so, $f(x) = 6b^x$
$750 = 6(b)^3$
$125 = (b)^3$
$5 = b$
$f(x) = 6(5)^x$
I had to look up the solution for this one.I didn't know where to start. I realized that when I get stuck at the beginning I should plug in an x value into the function and just see what it gives me. I'm still a little confused on why we set the function equal to 750.

How many milligrams will remain after 54 hours?
23) $f(x) = ab^x$
$50 = 100b^35$
$f(x) = 100(0.98031)^x$
$f(54) = 100(0.98031)^54 = 33.58$ milligrams
I understood how to solve it. However, the problem I came across was getting rid of the $(b)^35$. I have gotten better with dealing with exponents however, one area I still get confused on is how to get rid of them when they are larger then 2 or 3. After doing the rest of this section I have gotten to learn that you can multiple it by the reciprocal to get rid of the exponent. I feel like I need to strengthen my knowledge in radicals more. I still feel like I have a weak understanding of them.

2 Graphs of Exponential Functions

Sketch a graph of the transition given from $f(x) = 2^x$.
11) $f(x) = 2^{-x}$
I chose this one because I have been having trouble with getting things to graph. I didn't want to chose anything too complicated and not be able to complete it. I figured out how to plot it. However, I had trouble inserting the image into Latex. So, when I was in class I asked questions. However, based off the answer I was given I was not able to figure it out. I could not find the video on your website on how to do it.
Starting with $f(x) = 4^x$ find a formula with the transformation given.
18) Shifting f(x) 3 units downwards.
$f(x) = 4^x - 3$
I found this one easy because it is just remembering how transitions work in equations. It's important to remember that horizontals shifts are in a () with the 4, so for a vertical shift its after everything. Also that vertical shifts are represented with the respected directions of positive and negative.
Describe the long run behavior, as x approaches ∞ and x as it approaches $-\infty$
24) $f(x) = -2(3^x) + 2$

As x approaches ∞, $f(x)$ approaches $-\infty$, f(x) becomes negative because 3^x is being multipled by a negative number.

As x approaches $-\infty$, $f(x) = 2$, this is because $-2(x^{-x})$ will approach 0, which means f(x) will approach 2 as it is shifted up 2.
I found the first part and I understand where it came from, but when I checked my answer with the solution manual, I noticed I only had part of the answer. At first I was confused why it was needed. But I then realized the question was asking for when it approached positive and negative ∞.

3 Logarithmic Functions

Write each equation in exponential form.
2) $log_3(t) = k$ to $3^k = t$
I haven't worked with logarithms that much before this. So it took me a little longer than it should've to figure this problem out. However, after I realized what the exponential formula looked like it made it much easier to just replace the values in the correct formula. I understood what the problem was asking, I just did not remember the formula. So I had to look up the formula.
Rewrite each equation in logarithmic form.
10) $5^y = x$ to $log_5(x) = y$
After completing the last one it made this one much easier. I feel like I get confused when I see log because I know it doesn't necessarily do anything, but it makes me think I'm supposed to do something with it. However I kind of see it as another version of a variable but for a larger idea rather then one singular representation.

Solve for x.
18) $log_4(x) = 3$ to $4^3 = x$
$x = 64$
I found this one easy because all you need to do is use the inverse properties of logs which sets 4^3 already equal to x so you just need to solve 4^3.
$Solvetheequationforthevariable.$
42)$3^x = 23$
$x \approx 2.8555$
After asking questions about this one in class I realized it was incorrect because i was not taking the log of each side. The way I got my answer was by using trial and error to find x. But this is incorrect. I need to ask more questions in class.
Solve the equation for the Variable.
43) $7^x = \frac{1}{15}$
$x \approx -1.392$
I had to look up the solution to this one. I tried trial and error but after going to class I realized I was doing the same thing as the last one. I was not taking the log of both sides to cancel out the exponent.
Convert the equation into annual growth form $f(t) = ab^t$
62) $f(t) = 100e^{0.12t}$
$b = e^{o.12}$ so, $b = 1.1275$
$f(t) = 100(1.1275)^t$
I found this one difficult at first because I was rushing. However once I stopped and took my time with the problem I realized I was confused on how to find b. When there are equations within equations I get confused at first but once I take my time and realize what the question is asking I usually can figure it out. After finding b in this equation it was very simple because you just plugged in the information from there.

4 Logarithmic Properties

Simplify to a single Logarithm.
2) $log_3(32) - log_3(4) =$
$log_3(\frac{32}{4}) =$
$log_3(8)$
I thought this one was kinda easy. Once I realized it was subtracting a log_3, I knew that you rewrite the value by the second and then simplify it from there. Once again I saw the log and got nervous that I wasn't going to be able to figure out how to get rid of the logs. But I took my time with the problem and figured out you just divide the a values.
Simplify to a single logarithm, using logarithm properties.
22) $log(\sqrt{x^{-3}y^2}) =$
$log(x^{-3}y^2)^{\frac{1}{2}} =$
$\frac{1}{2}log(x^{-3}y^2) =$

$\frac{1}{2}(-3log + 2log$

I found this one complicated at first, however after taking my time with it I think I figured it out. I chose this problem to strengthen my knowledge with working with square roots and logs together. After completing this problem, I feel as though I have a better understanding of problems like these. My only question would be what would we do if it was $\sqrt[3]{x^{-3}y^2}$ would it be $\frac{1}{3}$ instead of $\frac{1}{2}$?

Solve each equation for the variable.

37) $log(x^3) = 2$ so,

$x \approx 1.259$

After asking questions in class I realized I was doing these problems wrong. I was just using trial and error to find the variable. I know now that this is not the correct way t do this. THe best way is to use a graph that helps show what the correct answer is.

5 Graphs of Logarithmic Functions

For each Function find domain and Vertical asymptote.

2) $f(x) = log(x+2)$

$x + 2 > 0$

$x + 2 = 0$

$x = -2$

Vertical Asymptote = -2

Domain: $x > -2$

I found this one a little confusing at first but once I realized you just set what is in the parenthesis equal to 0 and solve from there. It's important to remember that the domain is a range of numbers. while the vertical asymptote is a single answer.

For each Function find domain and Vertical asymptote.

6) $f(x) = log(2x+5)$

$2x + 5 > 0$

$2x + 5 = 0$

$2x = -5$

$x = \frac{-5}{2}$

Vertical Asymtote $= -\frac{5}{2}$

Domain: $x > -\frac{5}{2}$

After completing the last on I found this one very easy. This one a bit different because it had the 2 in front of the x but that just means you need too divide the -5 by 2. But none the less it was not difficult.

Sketch each transformation.

12) $2log(x)$

At first I couldn't get it to graph, I got it to show the graph with no data line. I asked questions in class and I was able to realize that I was typing a lowercase L in Mathematica for Log and it wasn't calculating correctly. After asking questions I was able to realize what I did wrong and was able to figure

out how to fix my problem. However, I am not able to put it into LaTex still. I asked questions in class but I can not find the video that you were talking about on your website.
Sketch each transformation.
16) $log_3(x + 4)$
Same thing as the last one. I had the lowercase L problem but I figured it out by asking questions. But still not upload images properly. I will work to have this fix for the next chapter.

6 Exponential and Logarithmic Functions

2) $200b^4 = 120$

$b^4 = (\frac{120}{200})$

$b^{4*\frac{1}{4}} = (\frac{120}{200})^{\frac{1}{4}}$

$b = (\frac{120}{200})^{\frac{1}{4}}$ or 0.8801

$80 = 200(0.8801)^t$

$\frac{80}{200} = (.8801)^t$

$log(\frac{80}{200} = log((.8801)^t) =$

$log(\frac{80}{200} = tlog(.8801) =$

$\frac{log(\frac{80}{200}}{log(.8801)} = 7.2$ hours

I found parts to this one easy. for this you need to understand what to plug into the equation from the word problem then solve from there. It's important to remember that "a" is the starting calue, b is what your looking for in this equation and t is how long. Then set that equal to the number remain after the given time. Then plug b back into the equation and solve for t. The part I had trouble with most was getting the t out. I remembered you use logarythims to get it in front of b and then divide by b to get t alone.
6) $0.5 = b^5 8$

$b = (0.5)^{\frac{1}{58}} = .9881$

$10 = a(.9881)^1 80$

$10 = a(.116)$

$a = 86.21.$

$h(t) = 86.21(.9881)^{480} =$

$86.21(.0032) \approx .2754$

I had trouble with this one. I had to look up the solution to help me work through it. I wasn't sure where to begin. I'm not sure where the .5 comes from, but I understand why it is needed. It allows you to cancel out the "a" and to allow for you to solve for b.
29) $log 7.9 = .8976$ and $log 4.7 = .6721$

$.8976 - .6721 = .2255$

I had to look up the solution to this one. I know I am doing something wrong. Because when I take the difference between the two, the answer I get is much different then the one given in the solution manual. It gives me a decimal. I feel as though I still need to focus on when to use certain formulas and why.

31) $log 3.9 = .591$ then $10^{.591*750}$
I also had to look up the solution to this one. After doing the last one I thought I was gonna understand more about the problem however I feel like I was even more stuck on this one. Once again I got the wrong answer. For these questions the solution manual doesn't really help you work your self through it.

7 Fitting Exponential Models to Data

I was not able to figure this section out. I under stand that you need to use mathematica. However I don't know where to begin on mathematica. I try and make the tables but then I do not know where to go from there. Then solution manual doesn't really help you with these either if you don't know where to start. It says take the log of all the y's but I do not know If i am doing it correctly because I don't know what to do with the decimals.