Fourth Project Assessment

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1 Section 4.1

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Problem 7: A population numbers 11,000 organisms initially and grows by 8.5 percent each year. Write an exponential model for the population.

Answer: $f(x) = 11,000(1 + 0.085)^x$

This problem was quite easy because I learned this in high school. You multiply the Population by the rate and since it's constantly growing you add 1 to the rate and x is the number of years.

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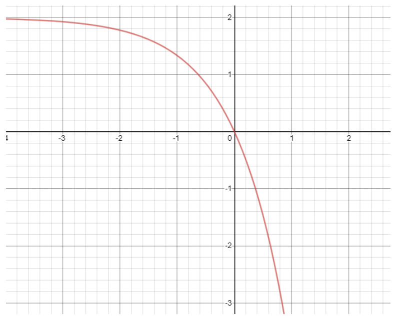
Find a formula for an exponential function passing through the two points.

Problem 14: (0,3)(2,75)
Answer: y = 36x + 3

This question was relatively easy because if you do y1 − y2 over x1 − x2 you get 36 as the slope and since a point is (0,3) the y - intercept is 3.

Describe the long run behavior, as x − > Infinity and x − > −infinity of each function

Problem 24: $f(x) = -2(3^x) + 2$



The long run line goes through the origin and starts to curve to left and levels out on the (2,0) line.

Problem 26: $f(x) = 4(1/4)^x + 1$

The long run line intercepts the y axis at 5 and curves down and levels out on the (1,0) line.

2 Section 4.2

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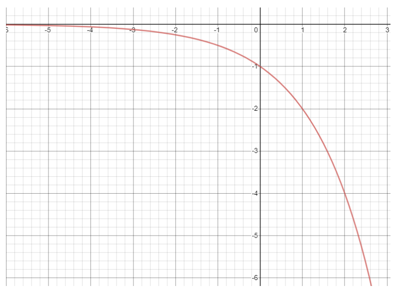
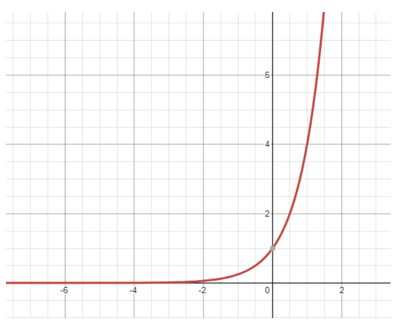
Sketch a graph of each of the following transformation

Problem 12: $g(x) = -2^x$



Starting with the graph of $f(x) = 4^x$, find a formula for the function that results from

Problem 17:



Answer: $f(x) = 4^x + 4$
this problem was easy as well. To shift the line up you add 4 to 4^x.

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Problem 23: A radioactive substance decays exponentially. A scientist begins with 100 milligrams of a radioactive substance. After 35 hours, 50 mg of the substance remains. How many milligrams will remain after 54 hours?

$f(x) = a(b)^x$
a = 100
$50 = 100(b)^{3}5$
$1/2 = b^{3}5$

$b = 0.98039$

Answer: $100(0.98039)^5 4 = 34.32$

To find this answer I had to look up multiple videos and do trial and errors because I was having a lot of trouble get the answer.

3 Section 4.3

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Rewrite each equation in exponential form

Problem 1: log4(q) = m
Answer: $4^m = q$

This problem was quite easy because all you have to do is take the number that's connected to the log (4) and put it to the power of m and equal it to q.

Rewrite each equation in logarithmic form.

Problem 10: $5^y = x$
Answer: log5(x) = y

This problem was easy as well because it's the same as problem 12 put in reverse. You take 5 and put it with log and put x in parentheses with log5 and set that equal to y.

Solve for x
Problem 17: log3(x) = 2
$3^2 = x$
Answer: $x = 9$

This problem was easy because all you had to do was put 3 to the power of 2 and you get x = 9.

Solve each equation for the variable

Problem 42: $3^x = 23$
log3(23) = x
Answer: x = 2.854

Problem 44: $3^x = 1/4$
log3(1/4) = x
Answer: x = -1.262

These problems were quite easy. It's easier to use the logarithmic form so just take 3 and put it with log and put 1/4 in parentheses with log3 and set that equal to x which equals -1.262

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problem 65: The population of Kenya was 39.8 million in 2009 and has been growing by about 2.6 percent each year. If this trend continues, when will the population exceed 45 million?

$45 = 39.8(1 + 0.026)^t$ $45 = 40.8348^t$
Answer: t = 4.2 years

This problem was difficult. I'm still not 100 percent confident in these types of problems. I watch multiply youtube videos and I still don't understand the question entirely.

4 Section 4.4

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Problem 1: log3(28) - log3(7)
Answer: log3(4) = 1.262
This was easy because you just subtract the numbers in parentheses and solve log3(4).

Use logarithm properties to expand each expression

Problem 17: $log(z^15y^13/x^19$

Answer: 15log(z) + 13log(y) - 19log(x)
This was quite easy because you put the power number in front of the log.

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Solve each equation for the variable.

Problem 37: $log(x^3) = 2$
Answer: x 4.642
This problem was quite complicated for me. I watched some youtube videos and what I did was use exponential form and a base of 10 and then solved.

5 Section 4.5

For each function, find the domain and the vertical asymptotic.

problem 1: f(x) = log(x - 5)
Answer: $x > 5$, Vertical line x = 5

Problem 4: f(x) = log(5 - x)
Answer: $x < 5$, Vertical line x = 5

Problem 5: f(x) = log(3x + 1)
Answer: $x > -1/3$, Vertical line x = -1/3

These problems were quite complex but I was able to get the concept of them. if the number is a negative number x is greater, if the number is positive x is less than, and with a coefficient you put the numbers into a fraction and make it negative.

Sketch a graph of each pair of functions.

Problem 9: f(x) = log(x), g(x) = in(x)

6 Section 4.6

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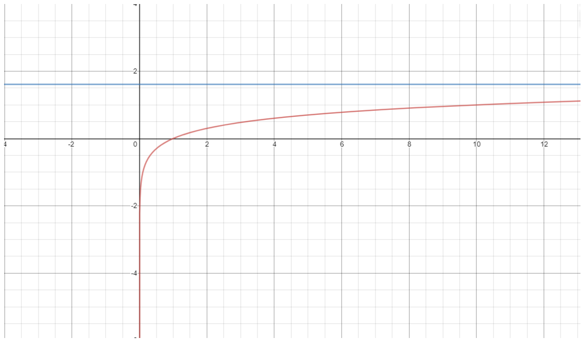
Problem 7: A scientist begins with 250 grams of a radioactive substance. After 225 minutes, the sample has decayed to 32 grams. Find the half-life of



this substance.

Answer: 75.49 minutes

Problem 9: A wooden artifact from an archaeological dig contains 60 percent of the carbon-14 that is present in living trees. How long ago was the artifact made? (The half-life of carbon-14 is 5730 years.)

Answer: 422.2 years old

Problem 29: The 1906 San Francisco earthquake had a magnitude of 7.9 on the MMS scale. Later there was an earthquake with magnitude 4.7 that caused only minor damage. How many times more intense was the San Francisco earthquake than the second one?

Answer: 10 times stronger

Problem 31: One earthquake has magnitude 3.9 on the MMS scale. If a second earthquake has 750 times as much energy as the first, find the magnitude of the second quake.

Answer: 5.8 Magnitude

7 Section 4.7

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Problem 9: (1,1125) (2,1495) (3,2310) (4,3294) (5,4650) (6,6361)

Answer: $y = 776.3(1.246)^x$

Problem 11: (1,1125) (2,1495) (3,2310) (4,3294) (5,4650) (6,6361)

Answer: $y = 724.4(1.1)^x$

For these problems I had to look up youtube videos to get an understanding of these questions 9 and 11. I put the data into scatter plots then put the best line of fit and took the log(y) of my y values and created a semi- log graph.

Problem 13: Total expenditures (in billions of dollars) in the US for nursing home care are shown below. Use regression to find an exponential function that models the data. What does the model predict expenditures will be in 2015?

Answer: $y = 55(1.1)^x$, 205 billion dollar by 2015

Problem 15: The average price of electricity (in cents per kilowatt hour) from 1990 through 2008 is given below. Determine if a linear or exponential model better fits the data, and use the better model to predict the price of electricity in 2014.

Answer: As a scatter plot, the exponential form would be better than a linear form. $7.6(1.02)^2 4 = 12.22$ dollars per hour.

For these problems I had to look up youtube videos to get an understanding of these questions 9 through 15. I put the data into scatter plots on desmos then put the best line of fit and took the log(y) of my y values and created a semi- log graph. Then, I just solved using my calculator