Project 4

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Units 4.1-4.7

Unit 4.1

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

of organisms	11,000	11,935
years	0	1

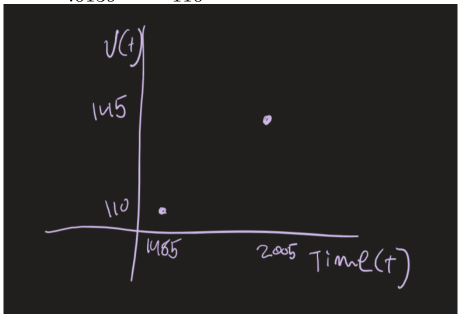
The equation is: $11,000 * (1.085)^2$
Reflection: I found this question relatively easy for me. At first I did not use the exponential form and solved it linearly.

13-22

25. A house was valued at 100,000 in the year 1985. The value appreciated to 145,000 by the year 2005. What was the annual growth rate between 1985 and 2005? Assume that the house value continues to grow by the same percentage. What did the value equal in the year 2010?

Valve v(t)	110,000	110,000(r*110,000	110,000+(1+r)^2
t	0	1	2

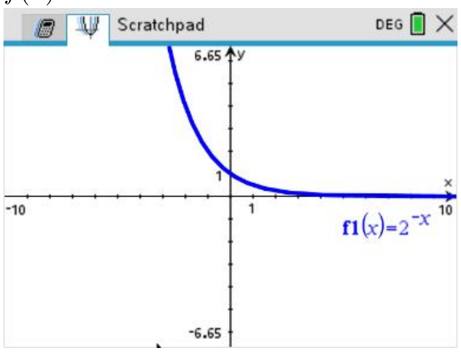
$r = \frac{(1+r)^2 0}{.0139} = \frac{145}{110} = 110,000 * (1 + .0139)^2 5$



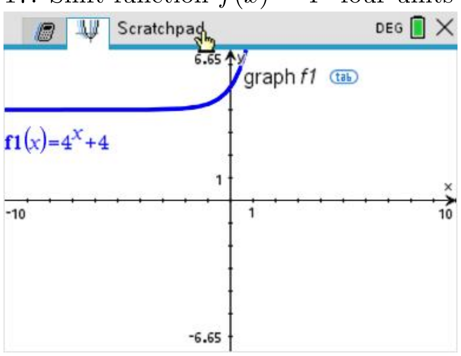
Reflection: I thought this question was a bit confusing. I don't quite understand

Unit 4.2

11. Sketch a graph of each of the following transformations of $f(x) = 2^x$
$f(x) = 2^{-}x$



17. Shift function $f(x) = 4^x$ four units up.



Reflection: I found both of these questions relatively easy. I just plugged the function into my calculator and for the transformation i just added 4 to the equation like we did in class and it did what I wanted it to.

23-27

Unit 4.3

Rewrite each equation in exponential form
1. $log_4(q) = m$
$4^m = q$

Rewrite each equation in logarithmic form.
9. $4^x = y$
$log_4(y) = x$
Reflection: I though that these question were easy for me to do, mostly due to the fact that they were very similar in terms of answering the question.

Solve for x
17. $log_3(x) = 2$ $x = 9$
Reflection: I thought this question was easy because it is just finding what 3^2 is.

Solve each equation for the variable.
41. $5^x = 14$
$5^x = 14 = log_5(14) = 1.6397$
Reflection: I found this question to be a little challenging. I can logic my way through it but I needed help doing it using logarithm properties.

65. The population of Kenya was 39.8 million in 2009 and has been growing by about 2.6percent each year. If this trend continues, when will the population exceed 45 million?
$45,000,000 - 39,800,000 = 5,200,000$
$\frac{5,200,000}{39,800,000*.026}$ or $\frac{5,200,000}{1,034,800} = 5$ years
Reflection: I thought this question was relatively easy, solving it algebraically. I still don't quite understand how logs would help me solve it.

Unit 4.4

Simplify to a single logarithm, using logarithm properties.
1. $log_3(28) - log_3(7) = 4$
Reclection: I thought this question was easy. I understood how to do it without looking it up.

Use logarithm properties to expand each expression.
17. $log(\frac{x^15*y^13}{z^19}$
Expanded: $15log(x) + 13log(y) - 19log(z)$
Reflection: I thought this question was relatively easy. I did look up how to do a different one just to see how it works and how to answer the question.

Unit 4.5

For each function, find the domain and the vertical asymptote.
1. $f(x) = log(x - 5)$
Domain= $x > 5$and Vertical asymptote is x=5

3. $f(x) = ln(3 - x)$
Domain= $x > 3$ and Vertical asymptote is x=3

5. $f(x) = log(3x + 1)$
Domain: $x > -1/3$ and Vertical asymptote is x= -1/3

7. $f(x) = 3log(-x) + 2$

Domain= $x < 0$ and Vertical asymptote is x= 0

Reflection: I found these questions to be a little challenging at first, but once I looked it up online it was a little easier. I am still a bit confused to what a vertical asympote is but I plan on asking in class or at the Stem Learning Lab.

Unit 4.6

1. You go to the doctor and he injects you with 13 milligrams of radioactive dye. After 12 minutes, 4.75 milligrams of dye remain in your system. To leave the doctor's office, you must pass through a radiation detector without sounding the alarm. If the detector will sound the alarm whenever more than 2 milligrams of dye are in your system, how long will your visit to the doctor take, assuming you were given the dye as soon as you arrived and the amount of dye decays exponentially?

RD(t)=ab^t
RD(0)=13

RD(0)=ab^t=a
a=13

RD(t)=13b^t
RD(12)=4.75

RD(12)=13$b^1$2

13$b^1$2=4.75

$b^1 2 = \frac{4.75}{13} = 0.365$
b=(0.365)$^{\frac{1}{12}}$
b=0.92

RD(t)=13(0.92)^t
13(0.92)^t=2
(0.92)^t=2/13

Log10(0.92)^t=Log10(2/13)
t*Log10(0.92)=Log10(2/13)
t=$\frac{Log10(2/13)}{Log10(0.92)}$=22 minutes

2. You take 200 milligrams of a headache medicine, and after 4 hours, 120 milligrams remain in your system. If the effects of the medicine wear off when less than 80 milligrams remain, when will you need to take a second dose, assuming the amount of medicine in your system decays exponentially?

HM(0)=200
HM(0)=ab^0=a

HM(t)=200b^t

HM(4)=120
HM(4)=200b^4

200b^4=120
b^4=$\frac{120}{200} = 0.6$
b=$(0.6)^1/4$
b=0.88

200$(0.88)^t$=120
0.88^t=$\frac{120}{200}$

$Log10(0.88)^t$=Log10($\frac{120}{200)}$
t*log10(0.88)=log10($\frac{120}{200}$)
$\frac{Log10120/200}{Log10(0.88)}$=3.996 or 4 hours

29. The 1906 San Francisco earthquake had a magnitude of 7.9 on the MMS scale. Later there was an earthquake with magnitude 6.8 that caused only minor damage. How many times more intense was the San Francisco earthquake than the second one?

$\frac{10^7.9}{10^6.8}$=10^1.1=12.59 times more intense.

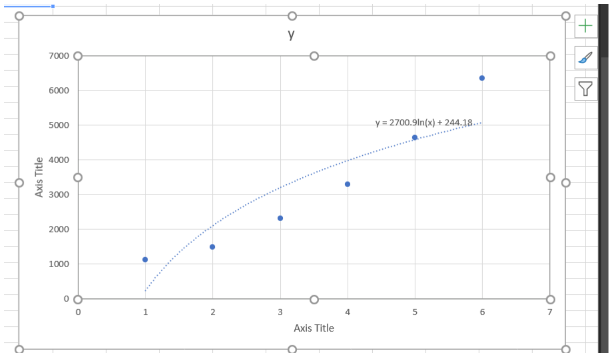
30. The 1906 San Francisco earthquake had a magnitude of 7.9 on the MMS scale. Later there was an earthquake with magnitude 6.5 that caused less damage. How many more times more intense was the San Francisco earthquake than the second one?

$\frac{10^7.9}{10^6.5}$=10^1.4= 25.12 times more intense

Unit 4.7

Use regression to find an exponential function that fits best given the data.
9.

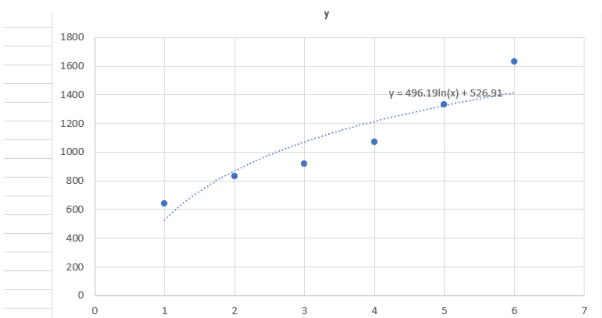
x	1	2	3	4	5	6
y	1125	1495	2310	3294	4350	6361



Equasion y= 2700.9ln(x)+244.18

10.

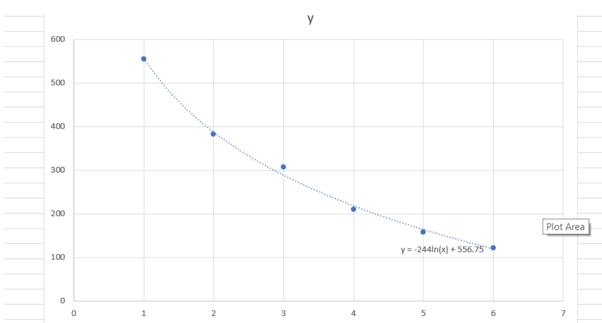
x	1	2	3	4	5	6
y	643	829	920	1073	1330	1631



Equasion: y= 496.19ln(x)+526.91

11.

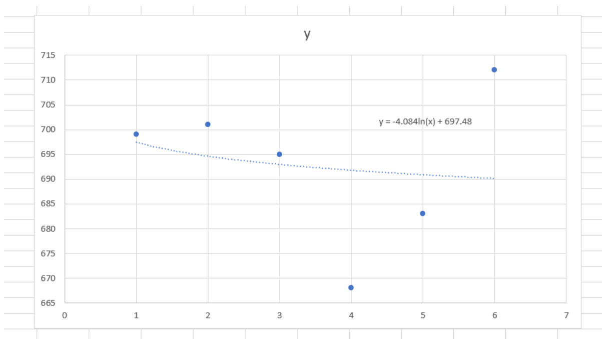
x	1	2	3	4	5	6
y	555	383	307	210	158	122



Equasion: y= -244ln(x)+556.75

12.

x	1	2	3	4	5	6
y	699	701	695	668	683	712



Equasion: y= -4.084ln(x)+697.48
Reflection: I found these questions relatively difficult. I looked up how to solve them online, and the only resource I had available to me was Microsoft Excel, so that is what I used. I am not confident in my answers so I plan on following up with the Stem Learning Lab.