Chapter 4

Deneille Davids

October 31, 2021

4.1

Question 7

. 11,000 organisms initially *grows by 8.5 percent each year

I first begin to document key factors the problem provides that will be needed to construct function.

In order to appease a function needed to find the growth following the population per year. The function that best displays this information is:
f(x)=11,000(1.085)^x

f(x)= 1.085

Question 13

for an exponential function passing through the two points (0,6),(3,750) In order to begin solving this problem, I initially had to familiarize myself on how exactly to achieve the function passing through the points.

To do so, I checked the guide in the course textbook.

$f(x) = ab^x$ is the forum that I will use to initialize the function. I will then substitute the provided information in the appropriate spots.

Substituting in (0,6) gives $6 = ab^0$ Substituting in (3,750) gives 750 ab^3

A substitution method will be most beneficial, a solving one equation for a variable, then substituting that expression into the second equation.

$6 = ab^0$ Solving for a

a =(6$\frac{}{b^0)}$=6b

I will substitute the formula above into the formula:
$1 = ab^2$ $1 = (6b)b^2$

$1 = 6b^2$

($\frac{1}{6}$)b^2 b=2$\sqrt{\frac{1}{6}}$

=0.408248290

$$(2x + 3)(x - 4)(3x + 1)$$

The degree of this polynomial is 1 while the leading coefficient is 3.

Question 23

substance decays exponentially begins with 100 milligrams of a radioactive substance. 35 hours, 50 mg of the substance remains

after 54 hours how much remain?

The coordinate given is (35,50)

$f(x) = ab^x$ b, your growth factor a=100 mg.

$(x) = 100(0.98031)^x$

when solving for b and inputting 54 into the value of x the remaining amount is

33.58 milligrams

Question 25

valued at 110,000 in the year 1985 value appreciated to 145,000 by the year 2005.

The problem offers appropriate information in terms of the growth rate for the corresponding years 2005 and 1985

$f(x) = ab^x$ can then use the coordinate point you're given to solve for b (110,000, 145,000)
to predict the value for the given year, solving for both a and b allows for use of the following equation to solve for the growth rate.
$f(x) = 110,000(1.0139)^x$
Annual growth rate: 1.39 percent $=1,555,368.09$

1 4.2

Question 11

$f(x) = x^-2$ The following function can be best illustrated when transferred to the graph calculator desmos. I am able to visualize said function- to further analyze the behavior of the growth.

Question 17

$f(x) = 4^x$ manipulated:4 units up The new function will translate to: $f(x) = 4^x + 4$

In order to determine this translation to be true, I understand that since the function is calling for 4 units up, I under it will be addition applied. Hence (+4).

1.1 Question 23

In order to properly evaluate the long run behavior as x approaches positive and negative infinity, I recognize that , $f(x)$ becomes negative because 4^x is multiplied by a negative number, whereas As x approaches negative infinity, (x) approaches 1, because $5(4^x)$ will approach 0, which means f(x) approaches -1 as it's shifted down one.

Abstract

Section 4.3

2 Question 1

In order to rewrite the equation to exponential form I assign a value to each integer provided. $log4(q)m$
$4^m = q$. Where the value inside the parenthesis is the equivalent to 4 to the power of m.

2.1 Question 9

$4^x = 7$ Similar to the previous question I recognize the form in which the equation needs to be rewritten where each value is in the appropriate place: But this time in Logarithmic form.

log4(7)=x

3 Question 17

$log3(x) = 2$
$3^2 =$ the value of x =9
I first recognize that in order to solve I have rewrite the equation to resemble that of an exponential form.

4 Question 41

$5^x = 14$
In order to solve for the variable x I will rewrite the equation to log form.

x=log5(14)
I then take the log of both sides of the equation, utilizing the exponent property for logs to pull the variable out of the exponent, then use algebra to solve for x. This method defines a solution for the value of x 2.078

4.1 Question 65

was 39.8 million in 2009
growing 2.6 percent each year

In order to find when the population will exceed 45 million I will begin by utilizing the exponential growth formula : $= ab^t$: In order to solve for t

The initial value is a=39.8 million people
b=(1+r)
where we have the write as an initial value of r=2.6So I solve for b: b=(1+2.6b=1.026
I will now solve for t and insert the appropriate values into the original exponential growth formula.
$45million = 39.8(1.26)^t$ It will take 4.78404 years to exceed the population of 45 million

Abstract

Section 4.4

5 Question 1

Simplify:

simplify using difference of logs property log3(28)=log3(7) The next step is to take the log of both sides, and utilizing the inverse property of logs,

which equals:log3 4

5.1 Question 17

expand to log form log $\frac{x^15y^13}{z^19} Ibeginbyaddinglog(x^15)andlog(y^13)usingthesumproperties- followingbytheuseofthedifferencepropertiesinordertosubtractlog(z^19)Usingtheexponentialproperties,t$
$15log(x) + 13log(y)19log(z)$

5.2 Question 27

$4^4x - 7 = 3^9x - 6$ Much like the previous question, my first step is to take the log of both sides of the equation, utilizing the exponent property for logs to pull the variable out of the exponent Moving the raised properties $4x - 7Ln(4) = Ln(3^9x - 6)$ Following this, I take the values and solve for the value of x. The following equals: x .7167

Abstract

Section 4.5

5.3 Question 1

F(x)=log(x-5)

The logarithm is only defined with the input is positive, so this function will only be defined when (x-5)¿0 In solving this inequality x¡ 1$_{\overline{5}}$

domain:x¿ 5 asymptote:x=5

5.4 Question 3

$f(x) = log(3 - x)$ In finding the Domain and asymptote, I look to Factor the numerator and denominator.After doing so, Observe any restrictions on the domain of the function. -Find any value that makes the denominator zero in the simplified version. This is where the vertical asymptotes occur. = Domain: x¡ 3, vertical asymptote: x= 3.

5.5 Question 5

Much like the previous question, the main goal is isolate the variables and use the products of them all. $f(x) = log(3x+1)$ Domain: x ¿ 1$_{\overline{3verticalasymptote:x=}}$- 1$_{\overline{3}}$

5.6 Question 7

Again, as stated above, by Simplifying the expression by cancelling common factors in the numerator and denominator. f(x)=3log (-x)+2

Domain: x¡¡0, vertical asymptote: x= 0.

Abstract

Section 4.6

5.7 Question 1

injects you with 13 milligrams of radioactive dye After
12 minute Letting t represent the number of minutes since the injections, 4.75 milligrams of dye remain in your system

Letting t represent the number of minutes since the injection then $m(t) = 13^x$
$2 = 13(0.9195)^t$

all in all after taking the log of both sides of the function the equation equals 22.3 minutes.

5.8 Question 3

The half-life of Radium-226 is 1590 years. Using the form $(t) = ab^t$ where a is the initial amount of Radium-226 in milligrams I will be looking for t time to utilize further. $0.5ab^1590$ further solving for b b 0.999564

5.9 Question 29

1906-a magnitude of 7.9 on the MMS scale later- magnitude 4.7

How many times more intense? it was about 63,095.7 times greater

When I plug in the values into the logarithmic form for each earthquake I am able to get the value of the intensity change. I take the difference to see how many times more intense one of the earthquakes was than the other.

5.10 Question 29

. One earthquake has magnitude 3.9 on the MMS scale. If when comparing to an earthquake which has 750 times as much energy

Given I have the original earthquake magnitude, which you can set to your equation, and then convert to exponential form.

I then multiply 750 by that exponential value, to solve for the magnitude of the second quake The magnitude of the second is:5.8167

Abstract

Section 4.7

5.11 Question 9

Using regression to find an exponential function 1.1125 2.1495 3.2310 4.3249 5.4650 6.6361

I first recognize that I must find the log(y) for your y values. 1-6. I Remember that since the logarithmic function is the inverse of the exponential function, the domain of logarithmic function is the range of exponential function, and vice versa. from a semi- log graph, to a log exponential which is further simplified to:

$y(x) = 776.25(1.426)^x$

5.12 Question 11

Using regression to find an exponential function 1.555 2.383 3.307 4.210 5.158 6.122

Much like the previous question, my first goal is to calculate the log values of each piece of data, following this, to look for the linear function using the desmos application. In doing so, the exponential function that best fits the best data set is:

$y(x) = 724.44(.738)^x$

5.13 Question 13

Using regression to find an exponential function 1990—53 1995—74 2000—95 2003—110 2005—121 2008—138

*predict expenditures will be in 2015: For part a, I follow the same steps as the questions above in order to further distinguish the exponential function.

For part (b), your evaluating your function at t= 25, so when I plug that in for my equation to solve for y

$(a)y = 54.954(1.054)^x$ (b) 204.65 billion in expenditures

5.14 Question 15

*predict the price of electricity in 2014 1990—7.83 1992—8.21 1994—8.38 1996—8.36 1998—8.26 2000—8.44 2002—8.24 2004—8.95 2006—10.40 2008—11.26

it appears that an exponential model is better considering the data set. So in each case, we need to find two things. In both cases, the y intercept and initial value are found where x = 0 (y intercept) and the table gives us these Once the linear equation is found, $y(x) = 7.603(1.016)^x$

Where t= 24, I plug that in for your equation to get 11.128 cents per kilowatt hour