MTH 150 Chapter 4

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Contents

1 Reflection

I was rather happy with my work for this project. I was able to completely finish the problems in time without any stress or rushing towards the end. Asking for help this chapter really helped and I don't really understand why I wasn't doing it all too much before. I felt like it really helped me understand what I was learning rather then just getting the answer. As for the work itself, I felt I understood it rather well and the stuff I didn't I was able to figure out using the explanations in the answer key or I just asked about it in class. Overall, I feel as if I had a much easier time with this chapter in comparison to the last one, asking for help and good time management really helps with these projects.

2 Section 4.1: Exponential Functions

2.1 Problem 7.

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

Answers:

$11,000 * 1.085^n$

Comments

At first, I was confused on how the percentage applied to this problem, though after asking for help in class, I was able to understand what I needed to do and how to solve the problem.

2.2 Problem 13.

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

Answers:

$f(x) = 6(5)^x$

Comments

Similar to the last problem, I had trouble at the beginning, but unlike the last problem, I didn't need to ask for help. For after rereading parts of the chapter I was able to understand how to do the problem and was able to solve it.
Of course, to be safe, I checked my answer using the book's answer key, which showed my answer to be correct.

2.3 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?

Answers:

33.58 milligrams

Comments

While this problem did take me a bit of time to complete, I completed it without all too much issues. It wasn't easy, but I wouldn't call it difficult either, somewhere in between.
Regardless, I checked my answer using the book's answer key just to be safe. Which proved my answer correct.

2.4 Problem 25.

A house was valued at 110,000 dollars in the year 1985. The value appreciated to 145,000 dollars 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?

Answers:

1,555,368.09 dollars
Annual growth rate: 1.39 percent

Comments

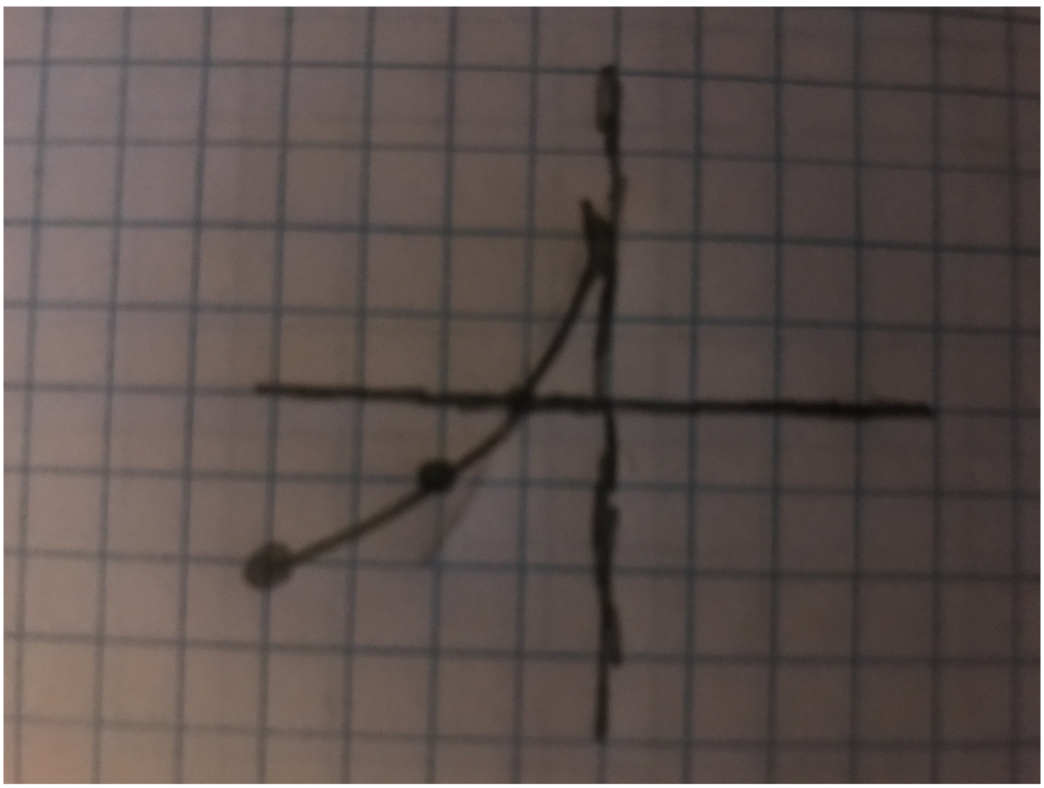
Thankfully, I didn't all to many issues with this problem. Even the ones I did have were rather minor. Though, as always, I checked my answer using the book's answer key, which showed my answer to be correct.

3 Section 4.2: Graphs of Exponential Functions

3.1 Problem 11.

Sketch a graph of each of the following transformations of $f(x) = 2^x$

Answers:



Comments

This problem was simple for me, as the only change to the base equation was the changing of x from positive to negative.
To be safe, I checked the book's answer key, which seemed to match my graph.

3.2 Problem 17.

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

17. Shifting $f(x)$ 4 units upwards

Answers:

$f(x) = (4^x) + 4$

Comments

This problem felt easy for me to solve. For all it really wanted was the graph of $f(x) = 4^x$ to be shifted upward 4 units.
While I was confident in my answer, I checked it, better safe than sorry. The answer key confirmed that my answer was correct.

3.3 Problem 23.

Describe the long run behavior, as x $\rightarrow$ infinity and x $\rightarrow$ negative infinity of each function

Answers:

as x$\rightarrow$infinity, f(x)$\rightarrow$negative infinity
as x$\rightarrow$negative infinity, f(x)=-1

Comments

I had a good bit of trouble with this problem. After working through this problem, I've realized that determining long term behavior is difficult for me. This pushed me to look up to answer to help me understand how to solve the problem. This did help understand a bit more of how to solve the problem, thankfully.

4 Section 4.3: Logarithmic Functions

4.1 Problem 1.

Rewrite each equation in exponential form

Answers:

$4^m = q$

Comments

After reading through the chapter I found this problem pretty easy, just reform the equation into the different equation. Of course, I checked my answer using the answer key, I found that my answer to be correct.

4.2 Problem 9.

Rewrite each equation in logarithmic form

Answers:

$log^4(y) = x$

Comments

With this problem being quite similar to the last one, I didn't have much issues. Just the opposite of the last problem, going into log form this time. Of course, I checked my answer in the answer key to be safe. It showed that my answer was correct.

4.3 Problem 17.

Solve for x

Answers:

x=9

Comments

I didn't have trouble with this problem either. I immediately realized that I needed to make the expression an exponential function, which then made the problem really easy to solve.
Again, I checked my answer, which was correct.

4.4 Problem 41.

Solve each equation for the variable

Answers:

1.639

Comments

Unfortunately, when I did this problem I didn't know how to solve it, which caused me to check the answer key. Though after seeing the answer and what the book said on how to find it, I realized what I needed to do and understood the problem.

4.5 Problem 43.

Solve each equation for the variable

Answers:

-1.392

Comments

From what I learned from the last problem I was able to solve this one. Of course the fraction did make it more difficult but I figured it out. To be sure I understood, I checked my answer, which thankfully was correct.

4.6 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?

Answers:

4.78404 years

Comments

Thankfully, I understood where to go with this problem. While it did take me a bit to calculate each part of the problem, I did figure it out.
I checked my answer with the book's answer key, at first my answer was slightly off, though I quickly realized it was just an input error, and corrected it to find my final answer, which the book agreed with.

5 Section 4.4: Logarithmic Properties

5.1 Problem 1.

Simplify to a single logarithm, using logarithm properties

Answers:

log3 (4)

Comments

After reading about the properties of logs, I found this problem to be really easy. I had no issues reaching my answer.
While I was confident in my answer, I still checked it. This showed my answer to be correct.

5.2 Problem 17.

Use logarithm properties to expand each expression

Answers:

15log(x)+13log(y)-19log(z)

Comments

Unfortunately, I didn't really get this problem at first. After a bit of trying different things to hopefully solve the problem, I looked up the answer. Thankfully, this really cleared up what I was supposed to do, and how a problem like this would be solved.

5.3 Problem 27.

Solve each equation for the variable

Answers:

x=-0.7167

Comments

I did know where to start with this problem, though it took me a bit of time to fully solve. When I checked my answer using the answer key, I saw that I made a few mistakes, though I was able to identify and correct them. The answer key helped me understand where I went wrong and I'm more confident with problems like this now.

6 Section 4.5: Graphs of Logarithmic Functions

6.1 Problem 1.

For each function, find the domain and the vertical asymptote

Answers:

Domain: x is greater than 5
Vertical Asymptote: x=5

Comments

While this problem did take a little bit of thinking and rereading of the chapter, I did figure it out. After some realizations about the problem, I realized how I would solve the problem.
I checked my answer using the answer key in the book, which showed my answer was correct.

6.2 Problem 3.

For each function, find the domain and the vertical asymptote

Answers:

Domain: x is less than 3
Vertical Asymptote: x=3

Comments

Now that I understood what I was supposed to do, I was able to solve this problem without many issues.
I checked my answer to be safe, which the answer key showed that my answer was correct.

6.3 Problem 5.

For each function, find the domain and the vertical asymptote

Answers:

Domain: x is greater than -1/3
Vertical Asymptote: x=-1/3

Comments

While this was a bit more complex than the previous problems, I was able to solve it without issue again.
I checked my answer to be safe, which the answer key showed that my answer was correct.

6.4 Problem 7.

For each function, find the domain and the vertical asymptote

Answers:

x¿0
x=0

Comments

Unfortunately, I had a lot of issues with this problem. While I understood the previous problems pretty well, I just didn't understand how to solve this one. I checked the answer key, which helped me understand how to solve it a bit more, though I'm still a little unsure.

7 Section 4.6: Exponential and Logarithmic Models

7.1 Problem 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 the 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?

Answer:

22.3 minutes

Comments

When I first looked at this problem, I didn't quite understand how I'd start a problem like this, though after it was reviewed in class, I understood and didn't have a trouble with it.

7.2 Problem 3.

The half-life of Radium-226 is 1590 years. If a sample initially contains 200 mg, how many milligrams will remain after 1000 years?

Answer:

129.3 milligrams

Comments

It did take me a good bit of time to complete this problem, I feel as if I understood it, even if it took me a bit to get at first. Thankfully I understood where to start and how to set it up, which really helped me get through the problem.
To be sure, I checked my answer using the answer key, which proved my answer correct.

7.3 Problem 5.

The half-life of Erbium-165 is 10.4 hours. After 24 hours a sample still contains 2 mg. What was the initial mass of the sample, and how much will remain after another 3 days?

Answer:

0.01648 mg

Comments

Just like the last problem, a slow but eventual completion of the problem. Though when I did check my answer the first time I did realize that it was slightly off as I simplified some of my math, where as in the answer key, it was not. I corrected this though, and made sure not to do so for the next problem.

7.4 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

Comments

Unfortunately, I had a good bit of trouble with this problem. Enough to push me to look up the answer using the answer key. Though the answer key did help me understand how I would solve it, and what I needed to do.

8 Section 4.7: Fitting Exponential Models to Data

8.1 Problem 9.

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

Answers:

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

Comments

After reading through this chapter, I didn't have too many issues with this problem, but it did take me a little bit to get it done. I didn't think this problem was hard, but it just took me a bit more time to complete.
I checked my answer using the answer key, which showed some minor mistakes that were easily correctable.

8.2 Problem 11.

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

Answers:

$y(x) = 724.44(0.738)^x$

Comments

Similar to the last problem, a good bit of work which slowed me down, but beyond that, smooth sailing.
Again, I looked at the answer key in the book, thankfully I was correct.

8.3 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? Find the oblique asymptote of each function.

Answers:

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

Comments

Again, similar story to the last two problems. Slow but not too difficult. Since this problem had an additional part, it took me a little bit longer than the other two.
I checked my answer using the answer key.

8.4 Problem 15.

Light intensity as it passes through water decreases exponentially with depth. The data below shows the light intensity (in lumens) at various depths. Use regression to find an function that models the data. What does the model predict the intensity will be at 25 feet?

Answers:

Exponential model would be better
11.128 cents per kilowatt hour

Comments

Like the rest of 4.7, slow but not too difficult. Since this problem was rather similar to the last one, I was able to get through it a bit quicker this time. I checked my answer using the answer key.