11th
Second guide

Name: _____.

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1. Exercise

This guide to functions and logarithms will be received on Monday, April 15 (two members). For more information, see chapter 3 of the book, pages 136 to 148.

Exercise 1.1. Graph each logarithmic function. Then state its domain and rage.

a) $y = \log_4(x)$ b) $y = \log_5(x)$ c) $y = \log_8(x)$

Exercise 1.2. Describe each transformation of $f(x) = \log_2(x)$. Then use a graph of $f(x)$ to sketch the graph of $g(x)$.

a) $g(x) = \log_2(x) - 3$ b) $g(x) = \log_2(x+2) + 4$ c) $g(x) = -\frac{1}{2}\log_2(x)$

Exercise 1.3. Write a function rule for $g(x)$, the described transformation of $f(x)$. Then confirm your answer by graphing $f(x)$ and $g(x)$ in the same window.

1. $f(x) = \log(x)$ translated 2 units left and 3 units down.
2. $f(x) = \ln(x)$ translated 5 units left and then reflected in the y-axis.
3. $f(x) = \log(x)$ reflected in the x-axis and translated 2 units up.

Exercise 1.4. Explain: Why is 0 not in the domain of $f(x) = \log(x)$?

Exercise 1.5. Specify the intervals of x for which $f(x) = \ln(x)$ is:

a) positive b) negative c) zero d) undefined

Are these intervals the same for $f(x) = \log(x)$?

Exercise 1.6. Example 7 illustrates how the Richter scale is used to compare earthquakes. Earthquakes with a magnitude less than 3.0 are often not felt, while the most severe earthquakes my measure 7.0 or higher.

Use $R = \log\left(\frac{A}{A_0}\right)$ to find the magnitude of the 2017 earthquake near Brenas, Puerto Rico, if its amplitude was 1200 times as great as A_0.

Exercise 1.7. Expand each logarithmic expression. Assume all variables are positive values.

a) $\log(xy^3)$

b) $\log(ab^2c)$

c) $\log(7x^4)$

d) $\log\left(\frac{3}{x^2}\right)$

e) $\log\left(100\sqrt[3]{x^2}\right)$

f) $\log_3\left(\sqrt{27xy^2}\right)$

g) $\log_7\left(\frac{49\sqrt{y}}{x}\right)$

h) $\log_2\left(\frac{\sqrt{2x}}{16y}\right)$

Exercise 1.8. Write each expression as a single logarithm.

a) $x\log(3) - 2\log(y) + \frac{1}{3}\log(z)$

b) $x\ln(3) + y\ln(2) - z\ln(3)$

c) $\ln(2x) + 3\ln(4x^2) - \ln(8x^4)$

d) $3\log\left(\frac{3}{2}\right) + 2\log(6x) - 2\log(3)$