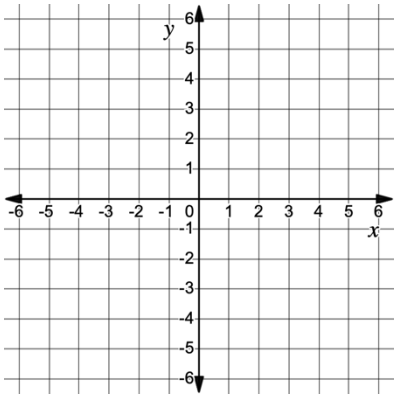
Lumberjack Graphs

You learned yesterday that logarithms undo exponentials by finding the missing exponent. Today we're going to explore the graphs of these inverse functions.

The table below represents the function $y = \log_2(x)$. Use the table to graph the function and answer the following questions:

x	y
¼	-2
½	-1
1	0
2	1
4	2



1. What value of x would produce an output of -5? How do you know?

2. What is the domain and range of this function?

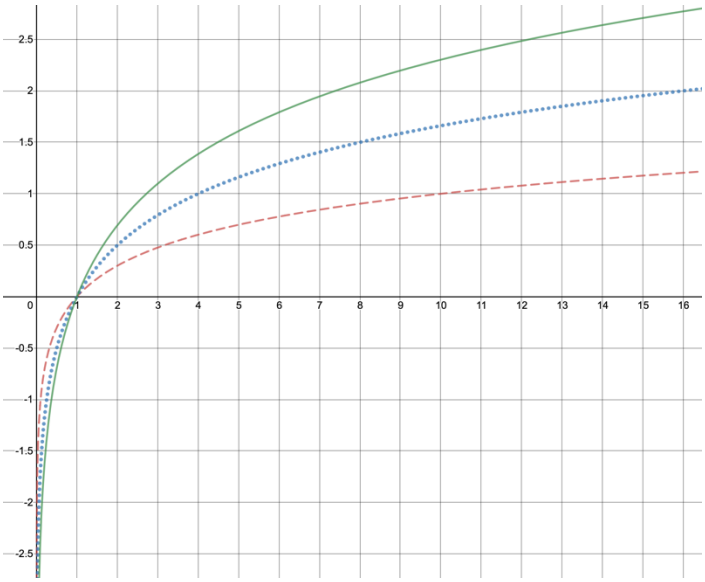
3. How are your answers to question 2 related to the domain and range of $y = 2^x$?

4. The graphs of three parent logarithmic functions are shown below.

   a. What do all of these graphs have in common?

   b. The equations for the three graphs are $y = \log x$, $y = \log_4 x$ and $y = \ln x$. Which is which? How do you know?

   c. Use the graph to estimate $\log_4 6$. What does your answer mean?



5. Suppose we shift the function $y = \log_4 x$ to the right three units.

   a. Write a new equation, $g(x)$, for the transformed function.

   b. How will this transformation affect the x-intercept, asymptote, domain, and range?

Lesson 5.5—Graphs of Logarithmic Functions

QuickNotes

Check Your Understanding

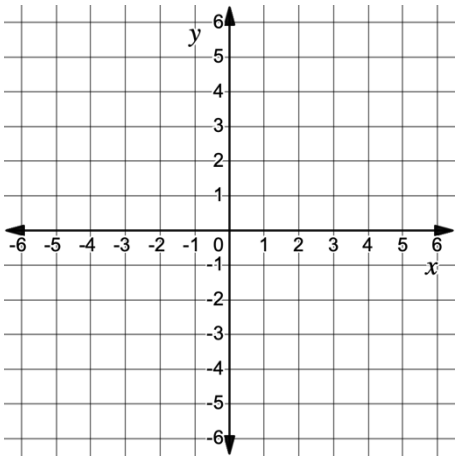
1. Graph $f(x) = \log_3(-x)$ without a calculator and identify the following:

   a. Vertical Asymptote

   b. X-intercept

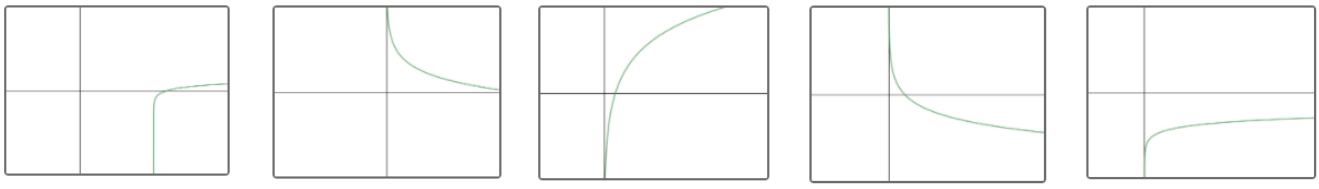
   c. Domain

   d. Range



2. Match the following equations with their graphs. Do not use a calculator.

$y = -2\log_2 x$ $y = 3\log_2 x$ $y = \frac{1}{2}\log_2(x-5)$ $y = -2\log_2 x + 5$ $y = \frac{1}{2}\log_2 x - 5$



A B C D E

3. Write an equation for a logarithmic function that has a vertical asymptote at $x = 5$ and goes through the point $(11, 1)$.