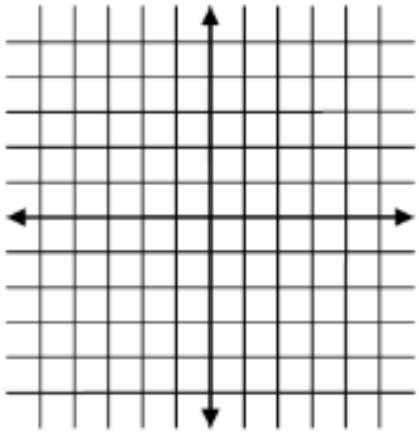
Name: Period: Date:

Math Lab: Logarithmic Functions

$y = 2^x$
Exponential Function

x	y
-3	
-2	
-1	
0	
1	
2	
3	

An **inverse** switches the x and y coordinates. It makes a reflection over the line *y = x*. Use the definition of inverse to sketch the graph of the exponential function and its inverse, the logarithmic function.

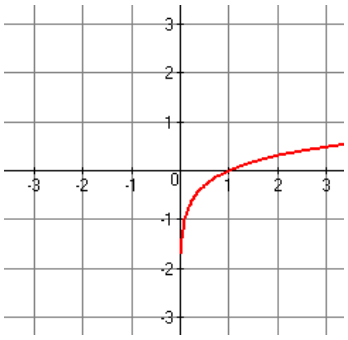


$y = \log_2 x$
Logarithmic Function

x	y

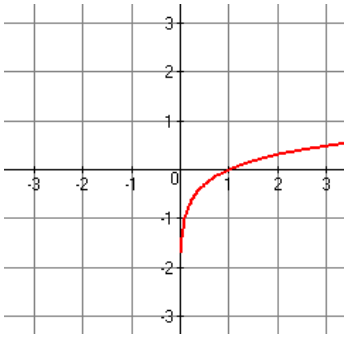
$\log_{10} x$ is called the **common log** and is written $\log x$. The log button on your calculator is the common log. For the following graphs, you will be using the common log. Sketch the graph of each transformation and state the domain and range.

1] $y = \log x + 1$



Domain:
Range:

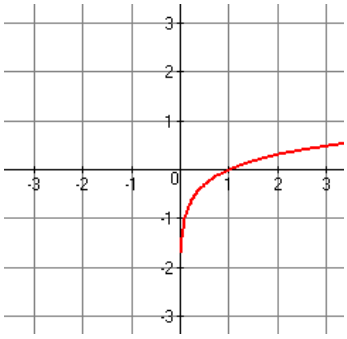
2] $y = \log x - 1$



Domain:
Range:

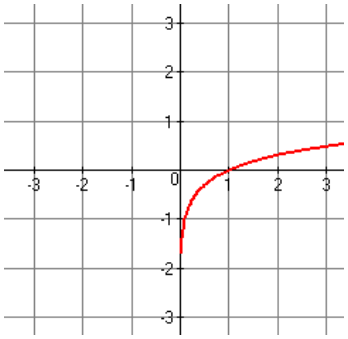
What affect does adding or subtracting a value "outside" the x have on the graph of the log function?

3] $y = \log(x + 1)$



Domain:
Range:

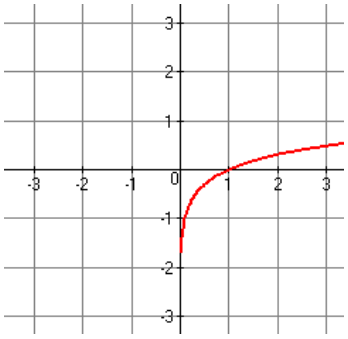
4] $y = \log(x - 1)$



Domain:
Range:

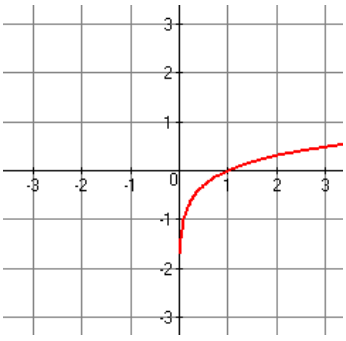
What affect does adding or subtracting a value from x have on the graph of the log function?

5] $y = -\log x$



Domain:
Range:

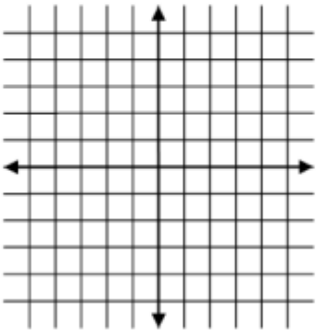
6] $y = \log(-x)$



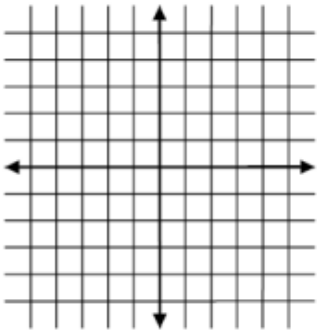
Domain:
Range:

What affect does multiplying x by a negative have on the graph of the exponential function? What affect does multiplying by a negative out front have on the graph?

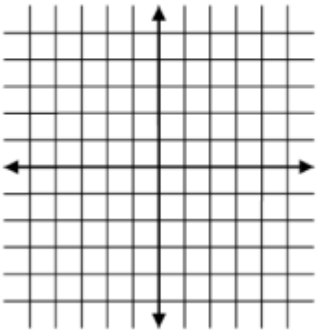
7] For each of the following functions, sketch the graph without a calculator. Describe any transformation(s) and state the domain and range for each.



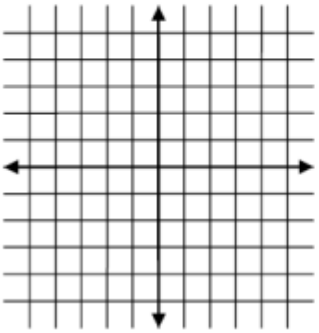
$f(x) = \log_2 x$



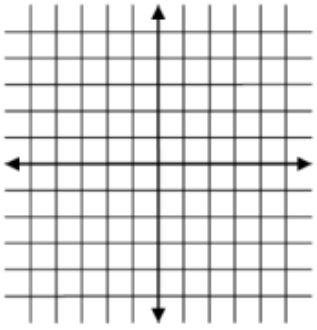
$f(x) = \log_2 (x - 2)$



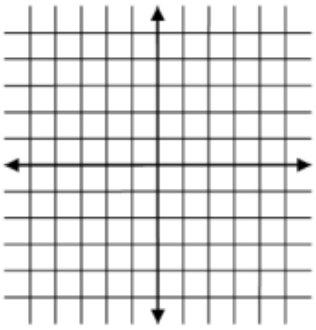
$f(x) = \log_2 (x) + 3$



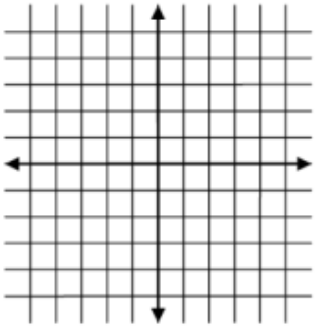
$f(x) = \log_2 (x - 2) + 3$



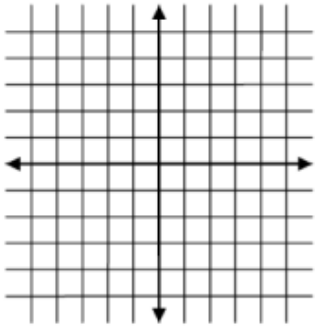
$f(x) = \log_3 (x)$



$f(x) = -\log_3 (x)$



$f(x) = \log_3 (x - 2)$



$f(x) = -\log_3 (x - 2)$