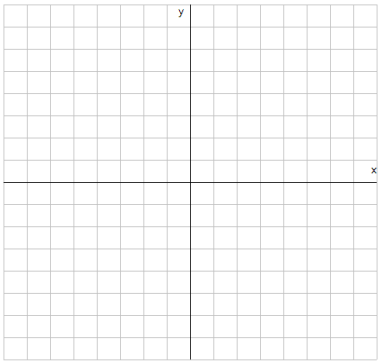
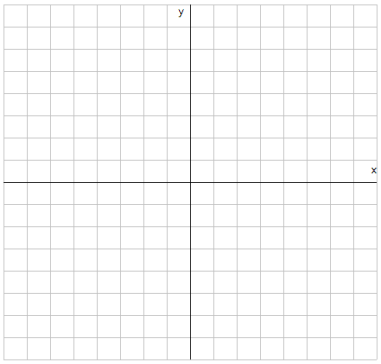
Graphing Exponential and Logarithmic Functions

Graph f(x) = 2^x

Graph f(x) = $\left(\frac{1}{2}\right)^x$

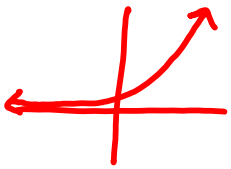




In general,

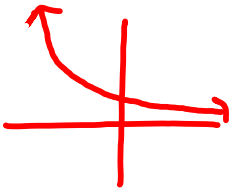
1) **The graph of f(x) =** b^x **will always contain the point (0,1).**

2) **b > 1 gives**



Exponential Growth

0 < b < 1 gives



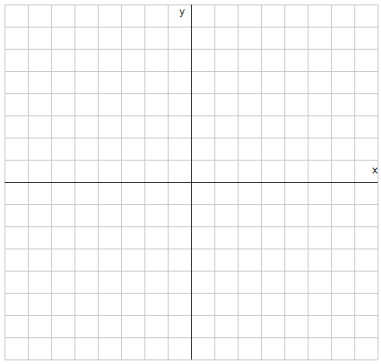
Exponential Decay

3) **The graph has a horizontal asymptote y = 0.**

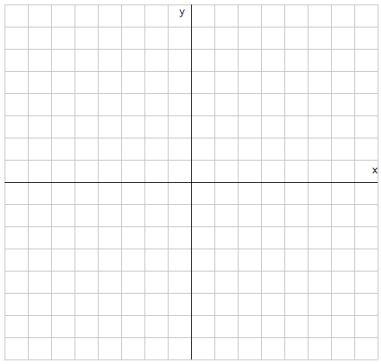
4) **The domain is** $(-\infty,\infty)$ **and the range is** $(0,\infty)$

5) **The function is one-to-one.**

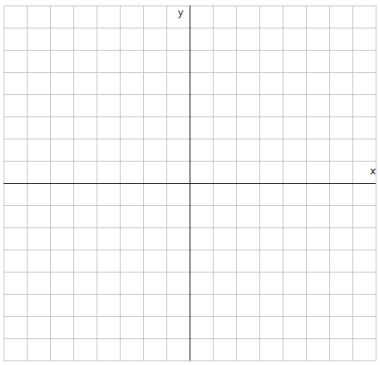
$f(x) = 2^x + 1$



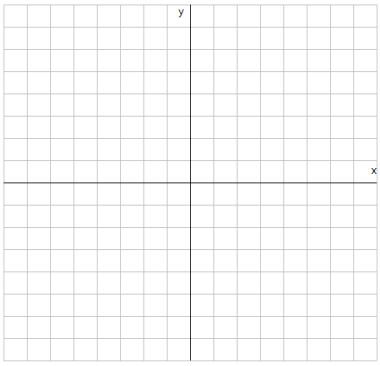
$f(x) = 3^{-x}$



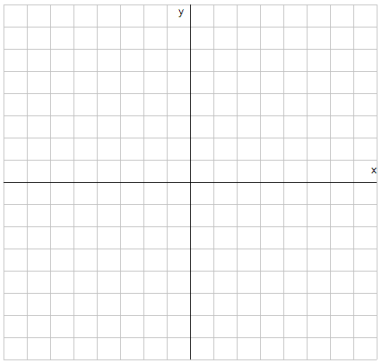
$f(x) = -\left(\frac{1}{2}\right)^{x} - 2$



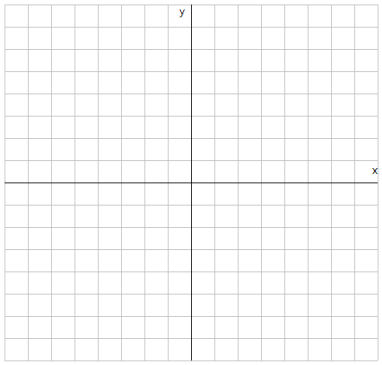
$f(x) = 3^{x-1}$



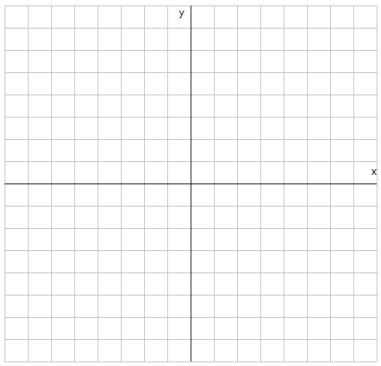
$f(x) = e^x$



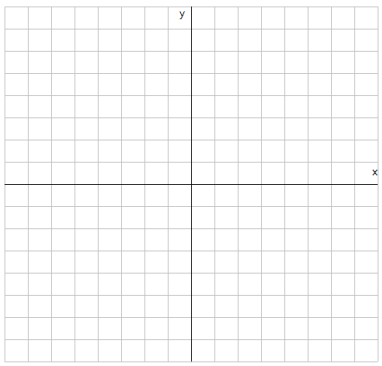
$f(x) = e^x + 2$



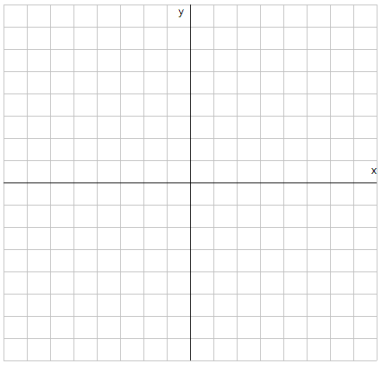
$f(x) = 3e^x$



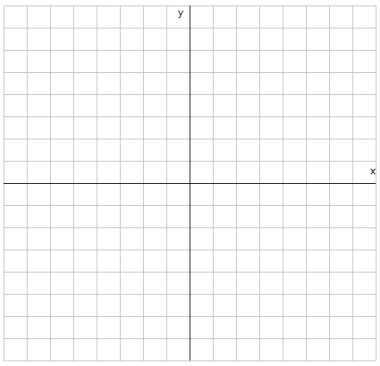
$f(x) = e^{x+1}$



Graph f(x) = $\log_2 x$

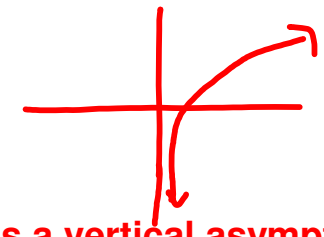


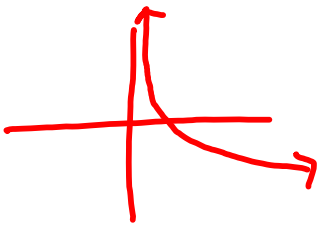
Graph f(x) = $\log_{\frac{1}{2}} x$



In general, if f(x) = $\log_b x$

1) The graph will contain the point (1,0).

2) b > 1 gives 

0 < b < 1 gives 

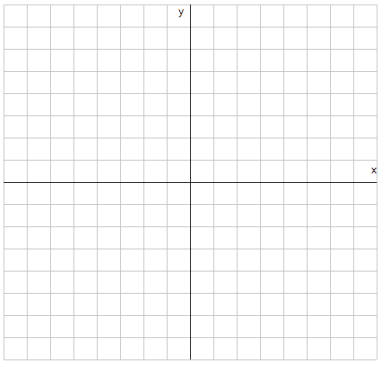
3) The graph has a vertical asymptote x = 0.

4) The domain is $(0, \infty)$ and the range is $(-\infty, \infty)$

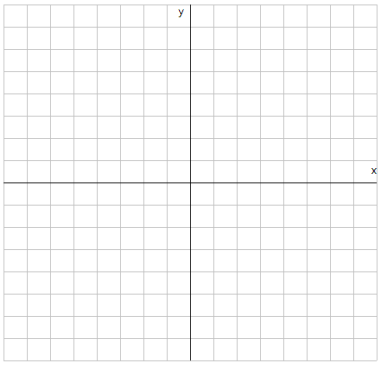
To make a graph it is sufficient to plot the points:

x	$y = \log_b x$
1	
b	
$\frac{1}{b}$	

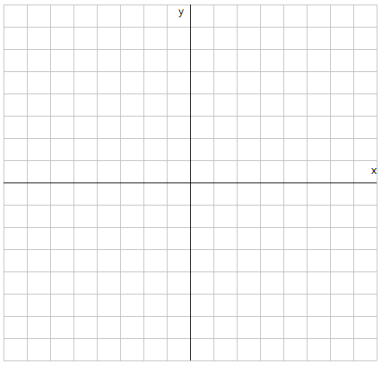
$f(x) = \log_6 x$



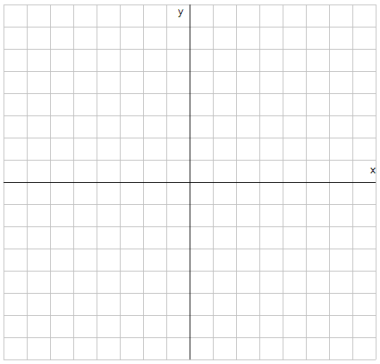
$f(x) = 2\log_{\frac{1}{5}} x$



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

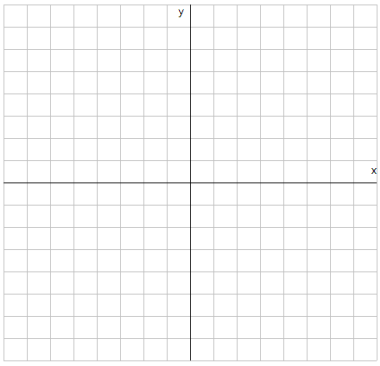


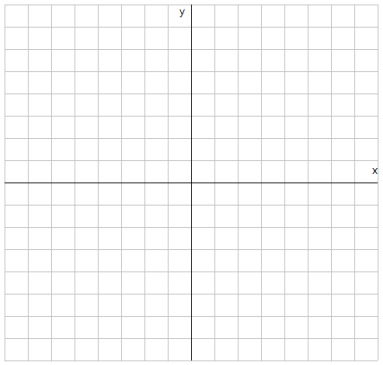
$f(x) = \ln x$



$f(x) = \ln x - 3$

$f(x) = -\ln x$

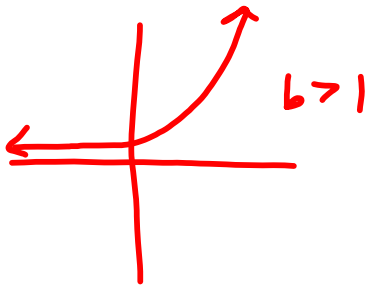


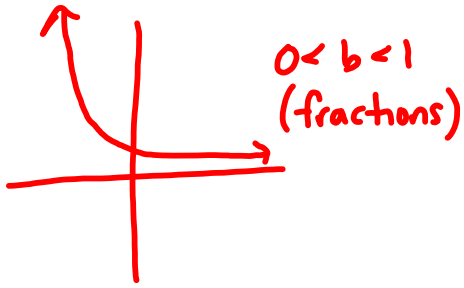


Summary of graphing:

Exponential Functions:

x	$y = b^x$
-1	
0	
1	





Logarithmic Functions:

x	$y = \log_b x$
1	
b	
$\frac{1}{b}$