

Graphing Exponential and Logarithmic Functions Video Lecture

Sections 12.3 and 12.4

Course Learning Objective:

Graph exponential and logarithmic equations.

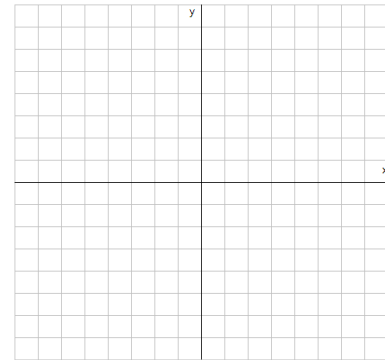
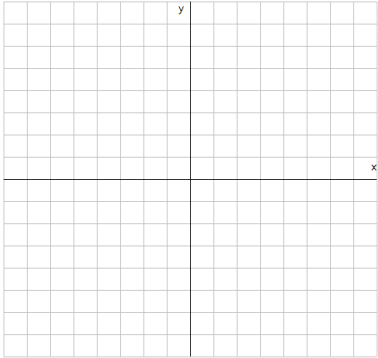
Weekly Learning Objectives:

- 1) Identify and graph exponential functions.**
- 2) Identify and graph logarithmic functions.**

Graphing Exponential and Logarithmic Functions

Graph $f(x) = 2^x$

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



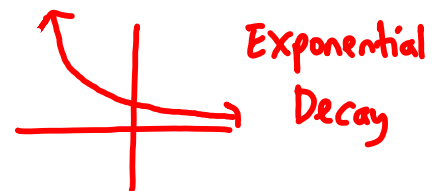
In general,

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

2) $b > 1$ gives



$0 < b < 1$ gives

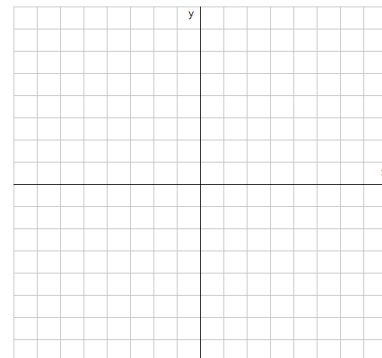


3) The graph has a horizontal asymptote $y = 0$.

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

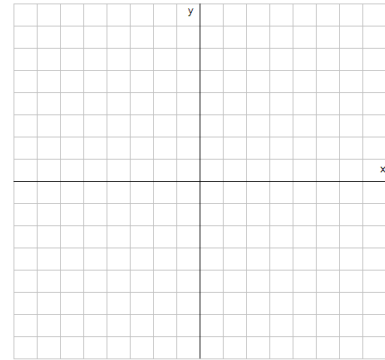
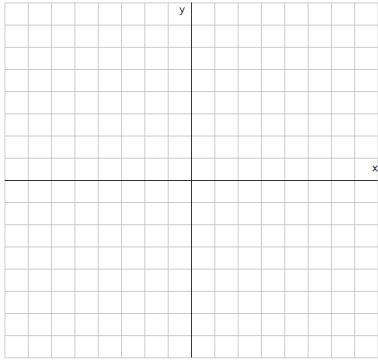
5) The function is one-to-one.

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

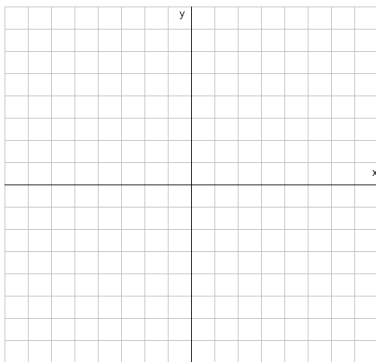


$$f(x) = 3^{-x}$$

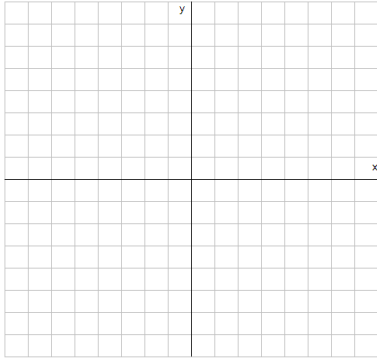
$$f(x) = -\left(\frac{1}{2}\right)^x - 2$$



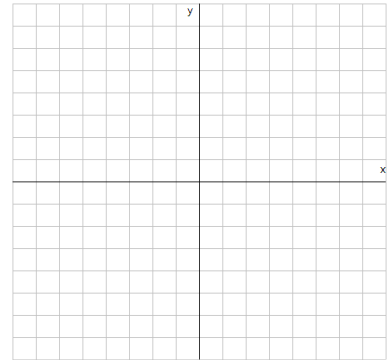
$$f(x) = 3^{x-1}$$



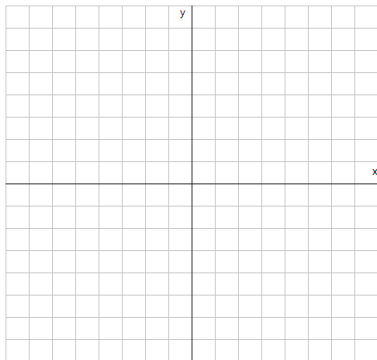
$$f(x) = e^x$$



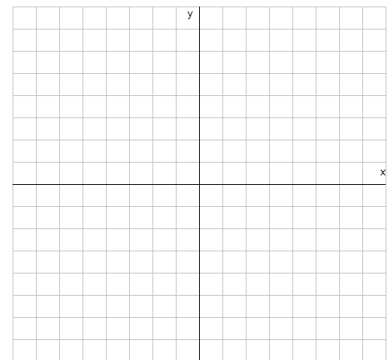
$$f(x) = e^x + 2$$



$$f(x) = 3e^x$$

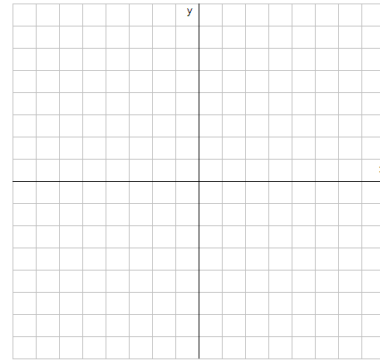
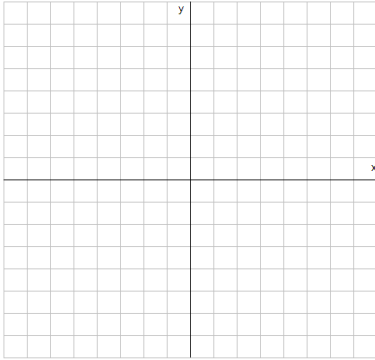


$$f(x) = e^{x+1}$$



Graph $f(x) = \log_2 x$

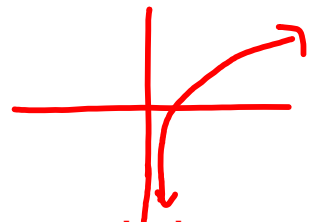
Graph $f(x) = \log_{\frac{1}{2}} x$



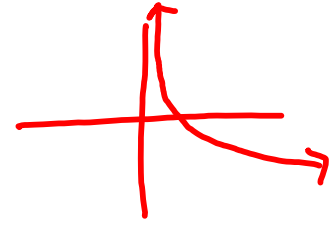
In general, if $f(x) = \log_b x$

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

2) $b > 1$ gives



$0 < b < 1$ gives



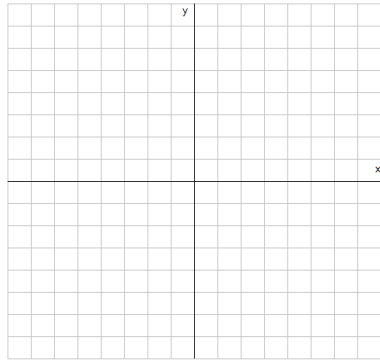
3) The graph has a vertical asymptote $x = 0$.

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

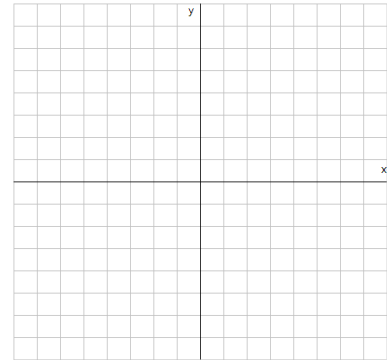
To make a graph it is sufficient to plot the points:

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

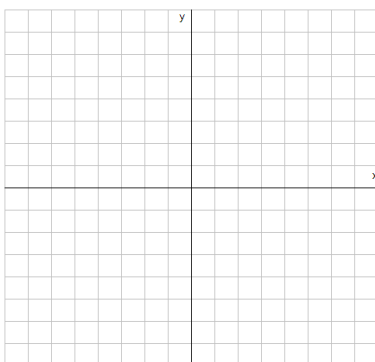
$$f(x) = \log_6 x$$



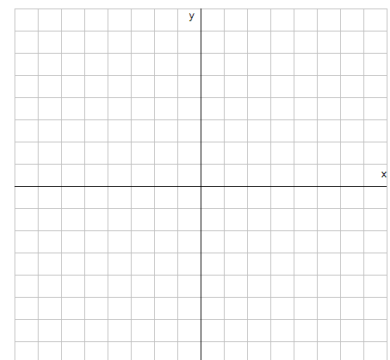
$$f(x) = 2 \log_{\frac{1}{5}} x$$



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

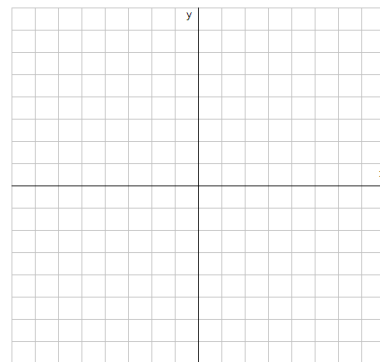
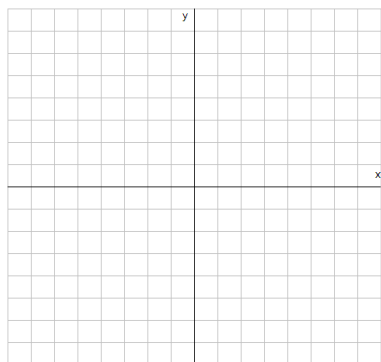


$$f(x) = \ln x$$



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

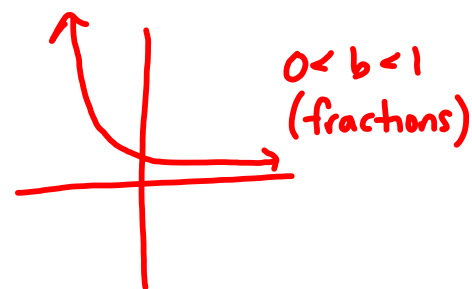
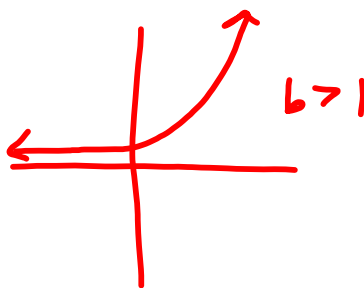
$$f(x) = -\ln x$$



Summary of graphing:

Exponential Functions:

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



Logarithmic Functions:

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

