

7-4 Graphing Logarithmic Functions

Objectives:

1. I can identify the transformations performed on a logarithmic function.
2. I can graph a logarithmic function by hand.
3. I can identify the asymptote of a logarithmic function.

Logarithms & Exponentials

$f(x) = 2^x$ & $f(x) = \log_2 x$ are inverses.

to find inverse:

1. switch x&y
2. solve for y

$$x = 2^y$$

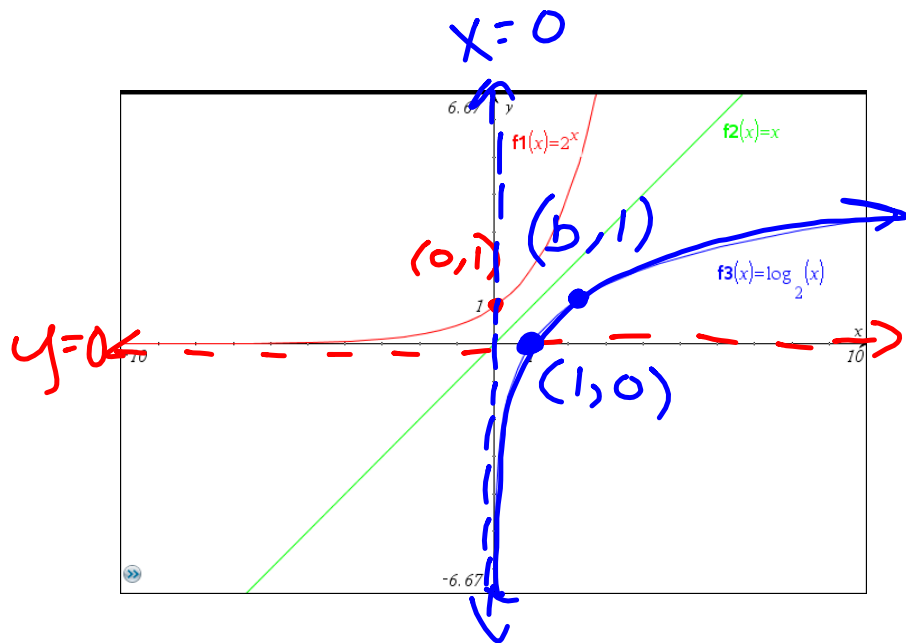
$$y = \log_2 x$$

$$\frac{x = 0}{(1, 0)}$$

$$\frac{(1, 0)}{(b, 1)}$$

$$(b, 1)$$

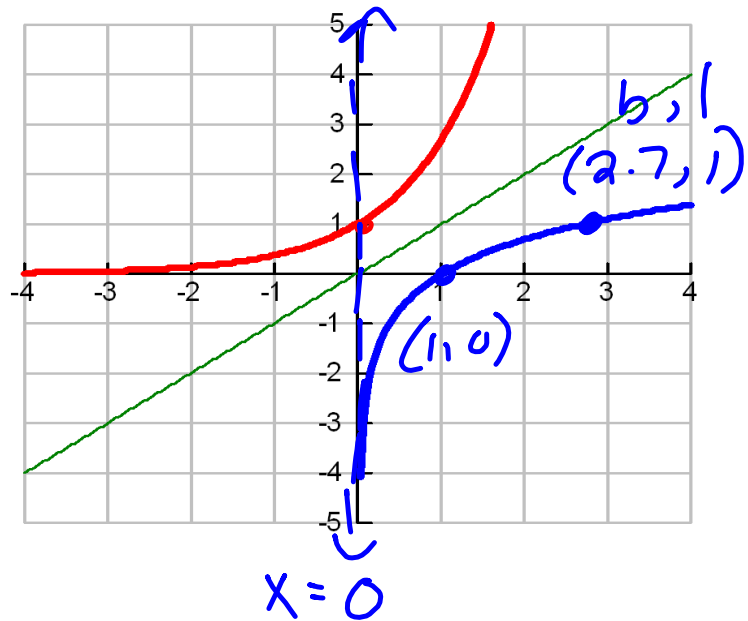
$$(2, 1)$$



natural log

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

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

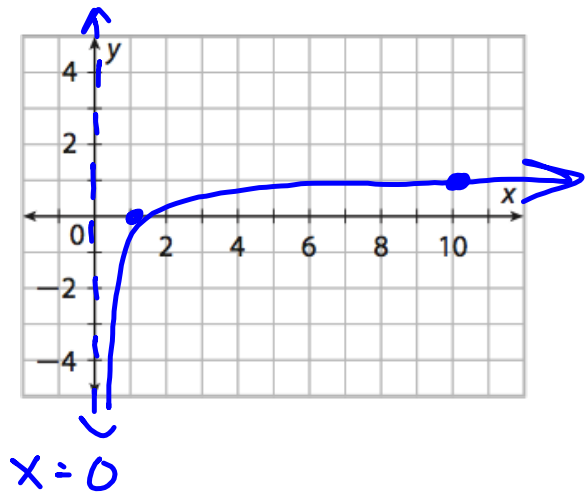


Complete the table for the function $f(x) = \log x$

Then plot the points on the graph and connect the dots.

x	$f(x) = \log x$
0.1	
1	
10	

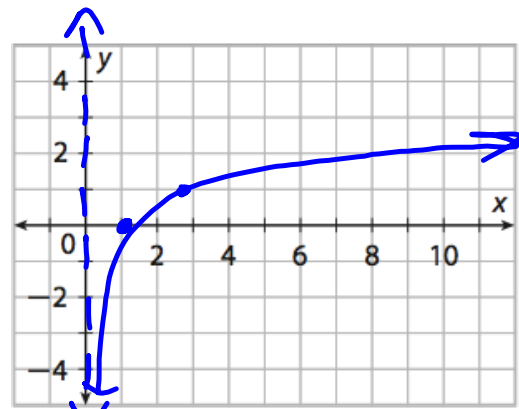
$$x = 0$$
$$(1, 0)$$
$$(10, 1)$$



Complete the table for the function $f(x) = \ln x$

Then plot the points on the graph and connect the dots.

x	$f(x) = \ln x$
$\frac{1}{e} \approx 0.368$	
1	
$e \approx 2.72$	
$e^2 \approx 7.39$	



$$x = 0$$

$$(1, 0)$$

$$(2.7, 1)$$

$$e$$

$$x = 0$$

Describe the transformations on each graph:

$$f(x) = \log(x + 2) \quad \text{Left } 2$$

$$f(x) = 3 \log(x) - 4$$

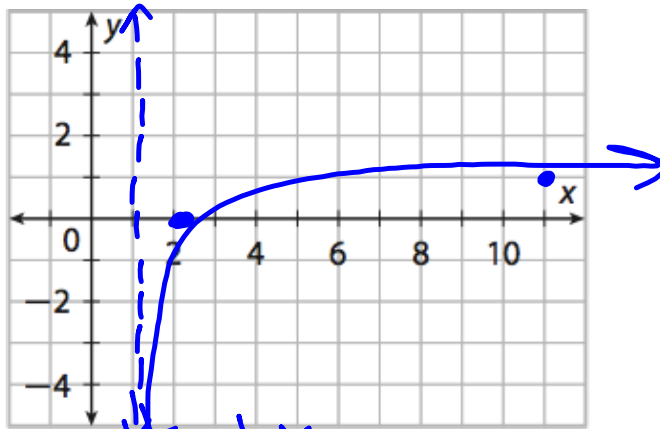
STRETCH 3
Down 4

$$f(x) = -2 \ln(x) + 5$$

- STRETCH 2
- REFLECT
- UP 5

Graph $f(x) = \log(x-1)$

Right I



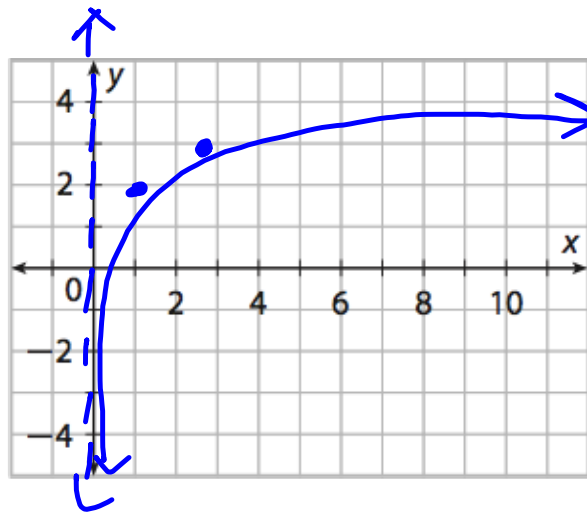
* $x=0$ ↓ $x=1$ *

(1, 0) ↓ (2, 0)

(10, 1) ↓ (11, 1)

Graph $f(x) = \ln(x) + 2$

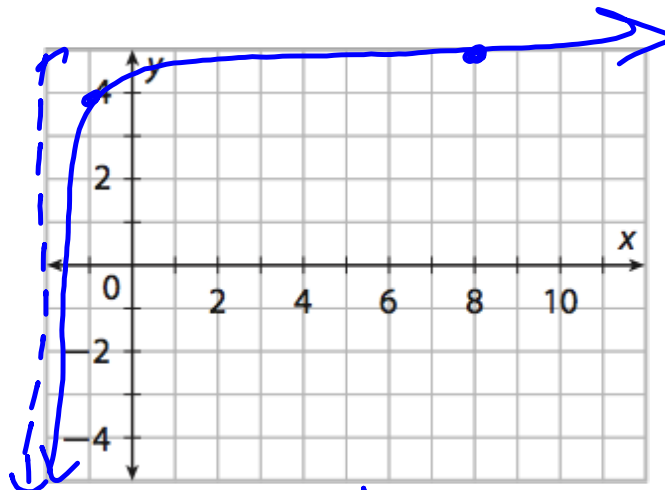
UP 2



$x = 0$ $(1, 0)$ $(2.7, 1)$
 \downarrow \downarrow \downarrow
 $x = 0$ $(1, 2)$ $(2.7, 3)$

Graph $f(x) = \log(x + 2) + 4$

Left + 2
UP 4



$x = 0$
↓
 $x = -2$

$(1, 0)$

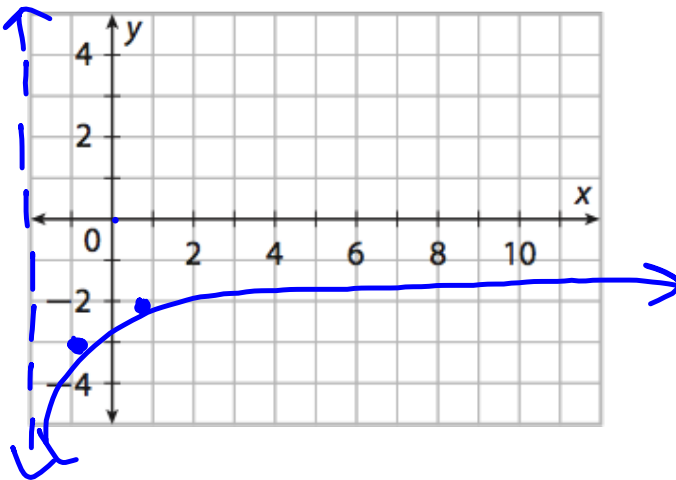
↓
 $(-1, 4)$

$(10, 1)$

↓
 $(8, 5)$

Graph $f(x) = \ln(x + 2) - 3$

Left 2
down 3



$$x = 0$$



$$x = -2$$

$$(1, 0)$$



$$(-1, -3)$$

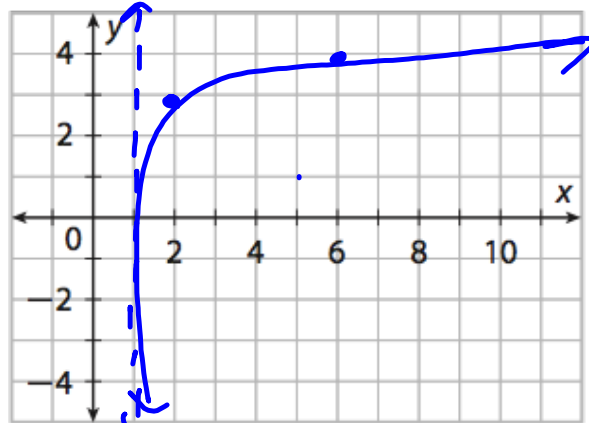
$$(2.7, 1)$$



$$(-.7, -2)$$

$$\log_5 (x-1) + 3$$

Right +
UP 3



$$x = 0$$



$$x = 1$$

$$(1, 0)$$



$$(2, 3)$$

$$(5, 1)$$



$$(6, 4)$$

$$\mathbb{R}^2 \log(x-2) - 1$$

$$D: (2, \infty)$$

$$\mathbb{R}: (-\infty, \infty)$$

$$x=0, x=2$$

$$(1, 0) \Rightarrow (3, -1)$$

$$(10, 1) \Rightarrow (12, 0)$$

