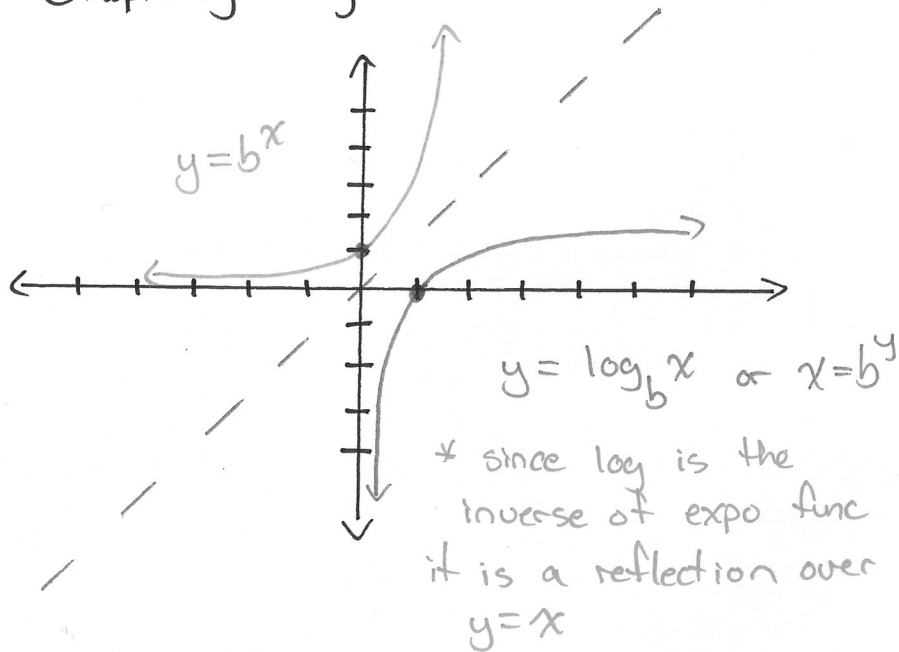


# Graphing Log



## Properties

$$y = b^x$$

Domain:  $\mathbb{R}$

Range:  $(0, \infty)$

Asym:  $y = 0$

Intercept:  $(0, 1)$

$$y = \log_b x$$

Domain:  $(0, \infty)$

Range:  $\mathbb{R}$

Asym:  $x = 0$

Intercept:  $(1, 0)$

# Graphing Log

$$y = a \log_b (x \pm h) \pm k$$

$b$  = base

$k$  = vertical shift  $\uparrow \downarrow$

$h$  = horizontal shift  $\leftarrow \begin{matrix} + \\ - \end{matrix} \rightarrow$   
(asymptote)

$a$  = vertical stretch/compression

Given:

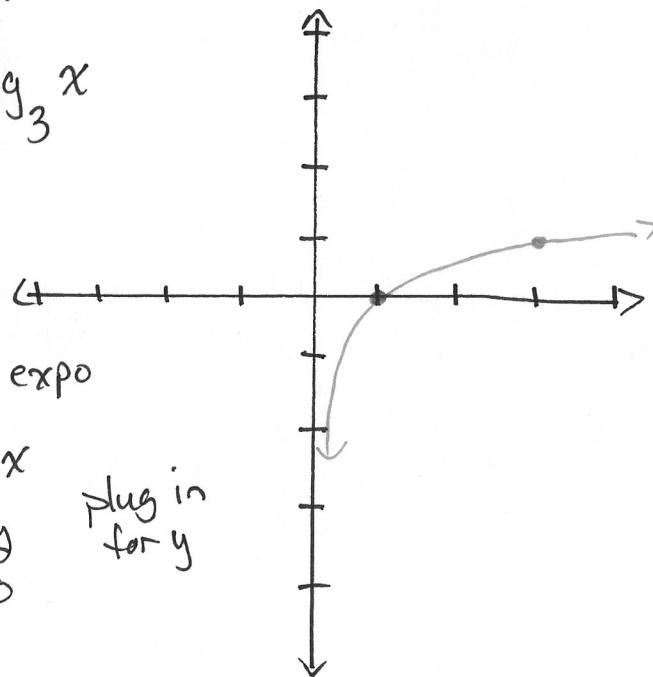
$$y = \log_3 x$$

write expo

$$3^y = x$$

$x$	$y$
1	0
3	1
9	2

plug in for  $y$

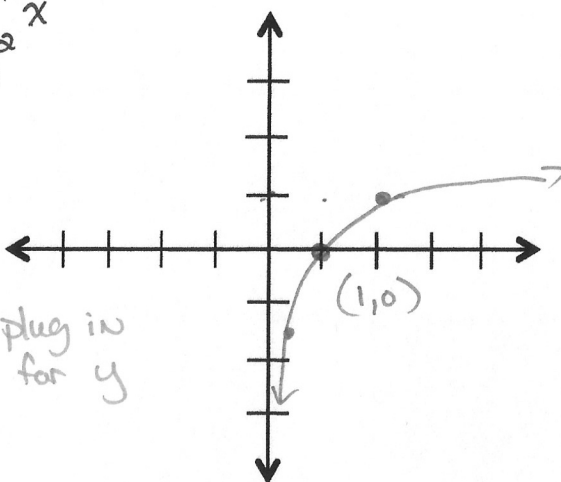


$$y = \log_2 x$$

$$2^y = x$$

x	y*
1	0
2	1
4	2

plug in for y



$$D: (0, \infty)$$

$$R: \mathbb{R}$$

$$\text{Asy: } x=0$$

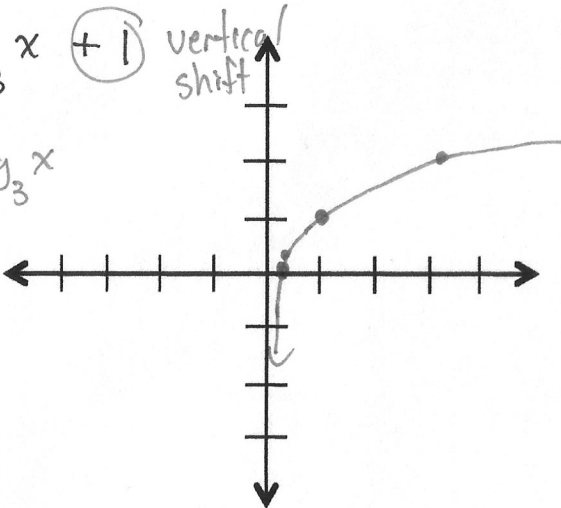
$$\underline{x\text{-int: } (1,0)}$$

$$y = \log_3 x \quad (+1) \text{ vertical shift}$$

$$y-1 = \log_3 x$$

$$3^{y-1} = x$$

x	y
1/3	0
1	1
3	2



$$D: (0, \infty)$$

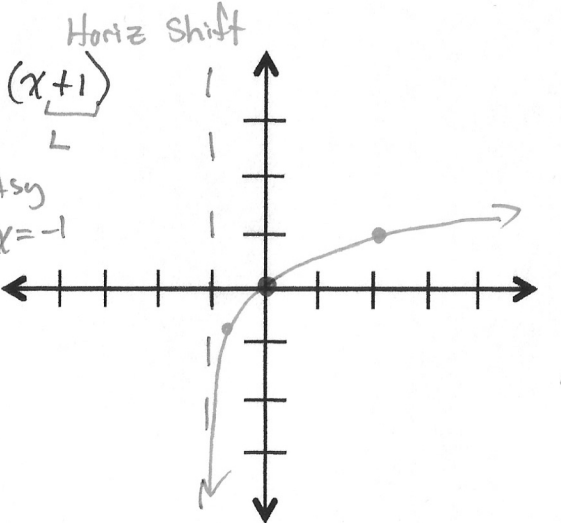
$$R: \mathbb{R}$$

$$\text{Asy: } x=0$$

$$\underline{x\text{-int: } (1/3, 0)}$$

$$y = \log_3 (x+1) \quad \text{Horiz shift}$$

$$\text{Asy } x=-1$$



$$D: (-1, \infty)$$

$$R: \mathbb{R}$$

$$\text{Asy: } x=-1$$

$$\underline{x\text{-int: } (0,0)}$$

$$y = \log_2 (x+3) - 1$$

$$\text{base } 2 \quad \text{Asy } x=-3$$

$$2^{y+1} - 3 = x$$

x	y
-1	0
1	1
5	2

$$y = 2 \log_4 x$$

$$\frac{y}{2} = \log_4 x$$

$$4^{y/2} = x$$

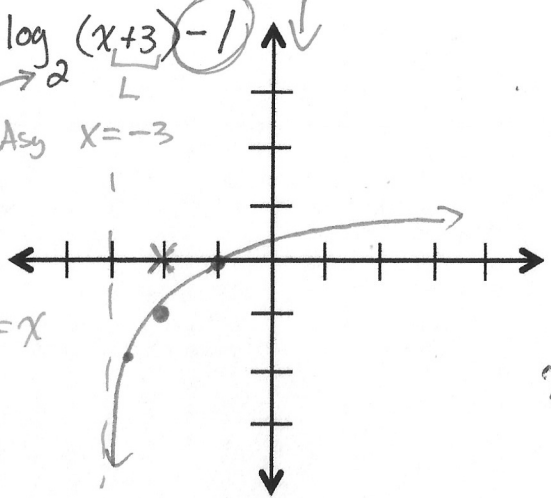
x	y	note
1	0	* since y/2
4	2	find value
16	4	divisible by 2
64	6	

$$y = 3 \log_4 (x-1) \quad R$$

$$4^{y/3} + 1 = x$$

x	y
2	0
5	3
17	6

\* choos values div by 3

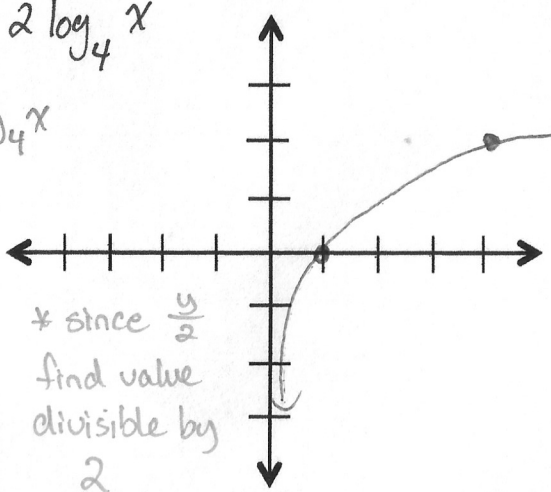


$$D: (-3, \infty)$$

$$R: \mathbb{R}$$

$$\text{Asy: } x=-3$$

$$\underline{x\text{-int: } (-1, 0)}$$

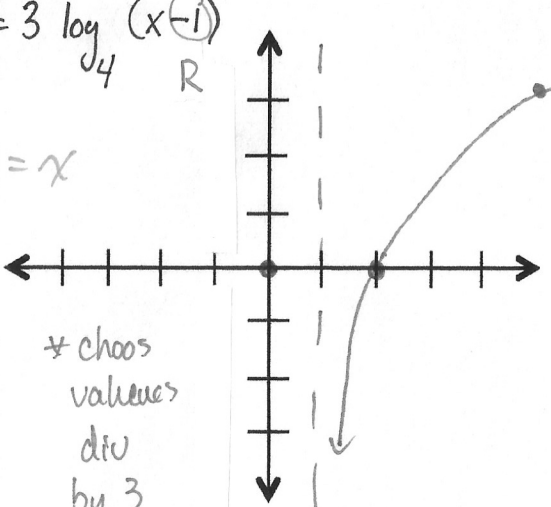


$$D: (0, \infty)$$

$$R: \mathbb{R}$$

$$\text{Asy: } x=0$$

$$\underline{x\text{-int: } (1,0)}$$



$$D: (1, \infty)$$

$$R: \mathbb{R}$$

$$\text{Asy: } x=1$$

$$\underline{x\text{-int: } (2,0)}$$

32)  $\frac{1}{2}(\log_7 x + \log_7 8) = \log_7 16$

33)  $2 \log_5(x - 2) = \log_5 36$

Graph each equation or inequality: Make a T-Chart for at least 5 values

34)  $y = \log_4 x$

$4^y = x$  ← plug in

x	y
1	0
4	1
16	2
64	3
256	4
	$\frac{1}{2}$

$4^{1/2} = 2$

35)  $y = \frac{3}{3} \log_2 x$  ← stretched

37)  $y \leq \log_2 x$

$2^y \leq x$

x	y
1	0
2	1
4	2
8	3
16	4

$2^{1/2} = 1.414$

35)  $y = \frac{3}{3} \log_2 x$  ← stretched

$\frac{y}{3} = \log_2 x$

$2^{y/3} = x$

x	y
1	0
2	3
4	6
8	9

38)  $y \geq 2 \log_2 x$

$2^{y/2} \geq x$

x	y
1	0
2	2
4	4
8	6
16	8

36)  $y = \log_5(x - 1)$

$5^y = x - 1$  ← Asymp

$5^y + 1 = x$

x	y
2	0
6	1
26	2
126	3
626	4

39)  $y > \log_{10}(x + 1)$

Asy  $x = -1$