Section 2.3

Logarithms

* inverse function of exponents

~~$\log_3 8$~~ $\log_2 8$ = what power do I put on the base 2, to get 8? = 3

* the answer to a logarithm is an exponent

The definition of a logarithm

$$y = \log_b x \iff b^y = x$$

$$\log_{(b)} x = y$$

$$\log_{(2)} 8 = x$$

$$8 = 2^{(x)}$$

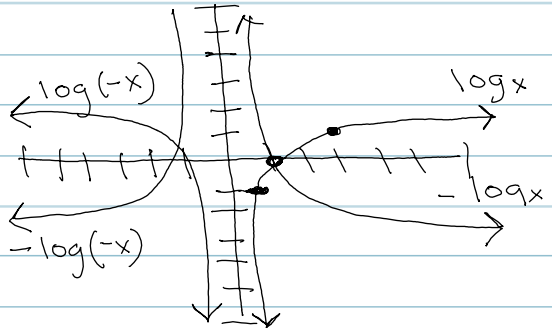
$$2 = 2$$

$$3 = x$$

$y = \log_2 x$

x	y
0	$\log_2 0$
2	$\log_2 2 = 1$
4	$\log_2 4 = 2$
1	$\log_2 1 = 0$

$\xrightarrow{\frac{1}{2}}$ $\log_2 \frac{1}{2} = -1$



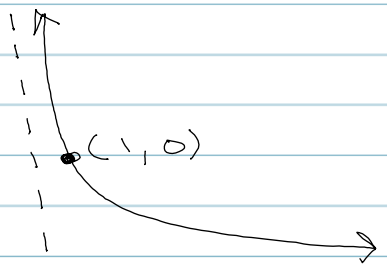
$-\log^x$

$y = -\log_3(x-1)$ — $\log\ (x-h) + k$

like: $-\log x$

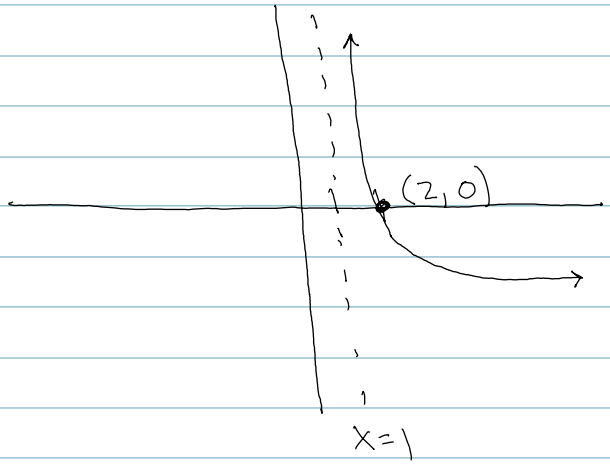
start: $(1,0)$

shift: $(1,0) + (1,0) = (2,0)$



(VA) Vert. Asym: $x = h$

$x = 1$



D: $(1, \infty)$

R: $(-\infty, \infty)$

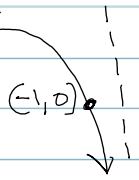
Ex.

$y = \log_5(3-x) + 7$

like: $\log(-x)$

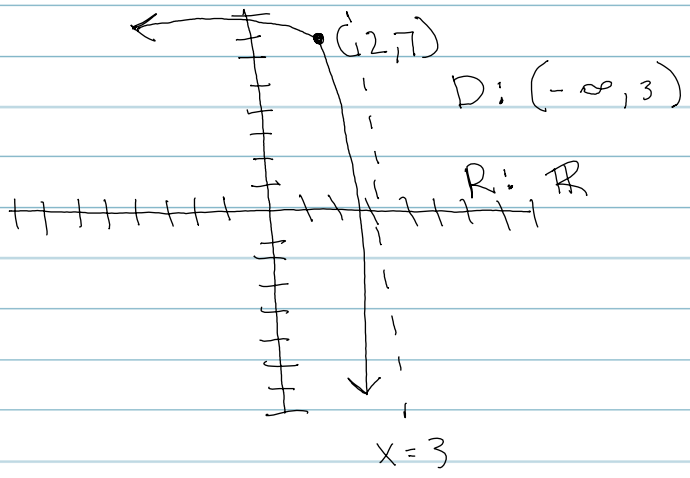
start: $(-1,0)$

shift: $(3,7) + (2,7)$



VA: $x = h$

$x = 3$



D: $(-\infty, 3)$

R: $\mathbb{R}$

$y = -2\log(x+1) - 4$

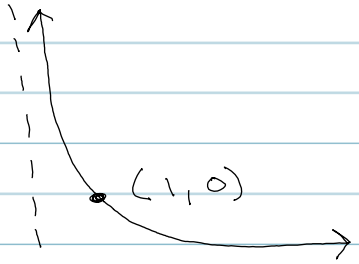
like: $-\log x$

Start: $(1,0)$

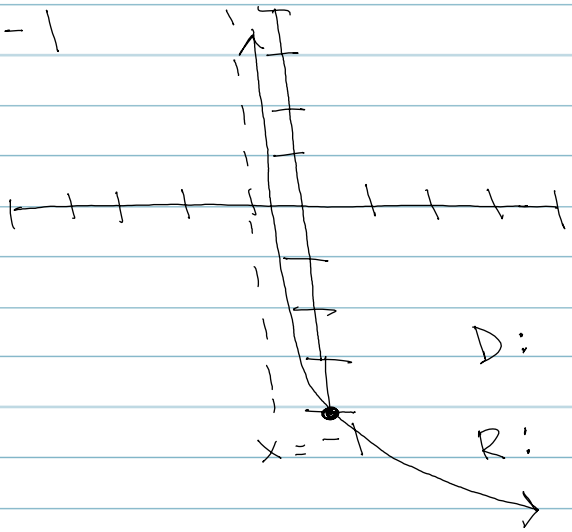
+

Shift: $(-1,-4)$

$(0,-4)$



V.A: $x = -1$



D: $(-1, \infty)$

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

Change of Base Formula

$y = \log_b a \Rightarrow \dfrac{\log_c a}{\log_c b}$ usually $c = e$ (ln), 10 (log)

$y = \log_2 x = \dfrac{\log_{10} x}{\log_{10} 2} = \dfrac{\log x}{\log 2}$

$(\log x)(\log 2)$ or $\log_2 x = \dfrac{\log_e x}{\log_e 2} = \dfrac{\ln x}{\ln 2}$