

8.2 Transformations of Log Functions

$$f(x) = a \log_c(b(x-h)) + k$$

Explore log functions with various values for $a, b, h, & k$. Keep c constant. Include $+$ & $-$ values for each parameter.

Focus on $D, R, VA, y\text{-int}, x\text{-int}$.

$y = \log x$ \rightarrow transformed

$D: x > 0$	$x > h$ (or $x < h$ if ref. over y -axis)
$R: y \in \mathbb{R}$	$y \in \mathbb{R}$
$VA: x = 0$	$x = h$
$y\text{-int}: N/A$	let $x = 0 \dots$ evaluate.
$x\text{-int}: (1, 0)$	let $y = 0 \dots$ solve for x .

$$\text{Ex) } y = \log_3(x+9) + 2$$

$$\begin{array}{l} 9 \text{ left, } 2 \text{ up} \\ h = -9 \quad k = +2 \end{array}$$

$$D: x > -9$$

$$R: y \in \mathbb{R}$$

$$0 = \log_3(x+9) + 2 \quad \text{VA: } x = -9$$

$$-2 = \log_3(x+9) \quad \text{x-int: } \left(-\frac{80}{9}, 0\right)$$

$$3^{-2} = x+9$$

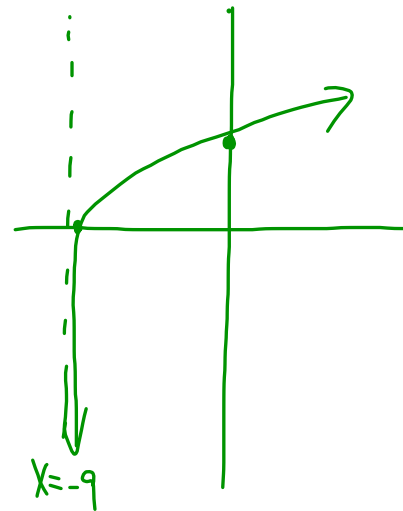
$$\frac{1}{9} = x+9$$

$$\text{y-int: } (0, 4)$$

$$\frac{1}{9} - 9 = x$$

$$\frac{1}{9} - \frac{81}{9} = x$$

$$-\frac{80}{9}$$



$$\text{Ex) } y = -\log_2(2x+6) \rightarrow -\log_2(2(x+3))$$

$$D: x > -3$$

$$0 = -\log_2(2x+6)$$

$$R: y \in \mathbb{R}$$

$$0 = \log_2(2x+6)$$

$$VA: x = -3$$

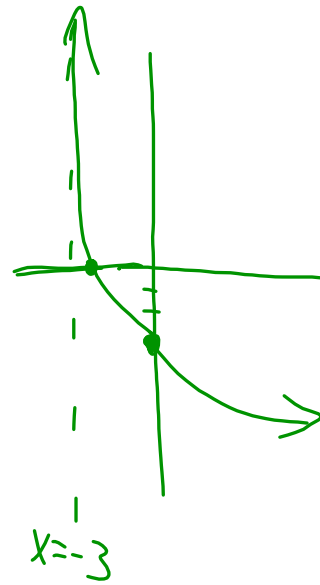
$$2^0 = 2x+6$$

$$x\text{-int: } (-2\frac{1}{2}, 0)$$

$$1 = 2x+6$$

$$y\text{-int: } (0; \log_2 6)$$

$$\frac{-5}{2} = x$$



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#1, 5, 8-12, 14, 15, 17, C1