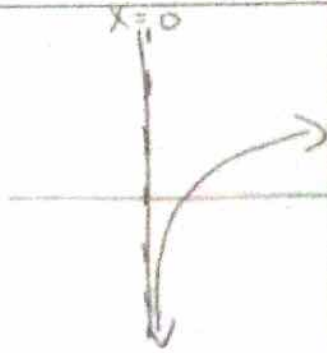
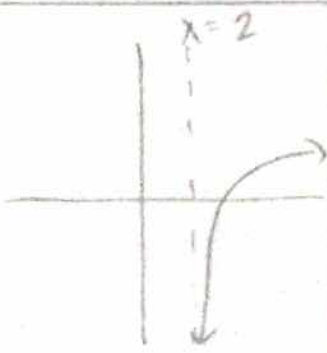
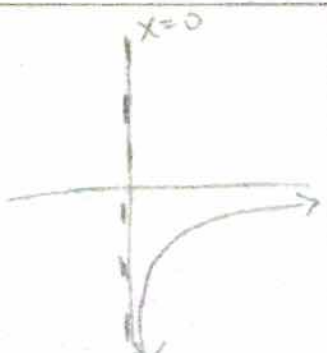
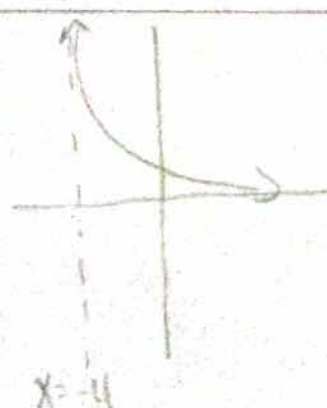


$$-\log(x+5)$$

5.2 Notes - Intro to Logarithmic Functions

#	Function	Transformations	Graph	Domain and Range	End Behavior and Asymptote
1	$f(x) = \log(x)$	NONE Parent		D: $(0, \infty)$ R: $(-\infty, \infty)$	Asymp $x = 0$ $\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow 0} f(x) = -\infty$
2	$f(x) = \log(x-2)$	Rt 2		D: $(2, \infty)$ R: $(-\infty, \infty)$	$x = 2$ $\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow 2} f(x) = -\infty$
3	$f(x) = \log(x) - 3$	dn 3		D: $(0, \infty)$ R: $(-\infty, \infty)$	$x = 0$ $\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow 0} f(x) = -\infty$
4	$f(x) = -\log(x+4) + 3$	reflect over x-axis left 4 up 3		D: $(-4, \infty)$ R: $(-\infty, \infty)$	$x = -4$ $\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow -4} f(x) = -\infty$

#	Function	Transformations	Graph	Domain and Range	End Behavior and Asymptote
5	$f(x) = 3\log(x-1)$	vert stretch right 1		D: (1, ∞) R: (-∞, ∞)	$\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow 1} f(x) = -\infty$

General Logarithmic form:  $f(x) = a\log(x-h) + k$

Equation	$y = \log(x-15)$	$y = \frac{1}{2}\log(x) - 7$	$y = -\log(x+8) + 5$
Transformations	rt 15	vert shrink down	reflect, lt 8, up 5
Domain	(15, ∞)	(0, ∞)	(-8, ∞)
Range	(-∞, ∞)	(-∞, ∞)	(-∞, ∞)
Asymptote and End Behavior	$\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow 15} f(x) = -\infty$ X = 15	$\lim_{x \rightarrow \infty} f(x) = \infty$ $\lim_{x \rightarrow 0} f(x) = -\infty$ X = 0	$\lim_{x \rightarrow \infty} f(x) = -\infty$ $\lim_{x \rightarrow -8} f(x) = \infty$ X = -8

### Properties of Equality for Logarithmic Functions

If  $b$  is a positive number other than 1, then  $\log_b(x) = \log_b(y)$  if and only if  $x = y$ .

Example:  $\log(x) = \log(5)$

$$x = 5$$

Solve:

1.  $\log(2x) = \log(x-8)$

$$2x = x - 8$$

$$x = -8$$

NO SOL

log can't be 0!

2.  $\log(3x-2) = \log(4)$

$$3x - 2 = 4$$

$$3x = 6$$

$$x = 2$$

3.  $\log(x^2) = \log(x+6)$

$$x^2 = x + 6$$

$$x^2 - x - 6 = 0$$

$$(x-3)(x+2) = 0$$

$$x = 3$$

$$x = -2$$