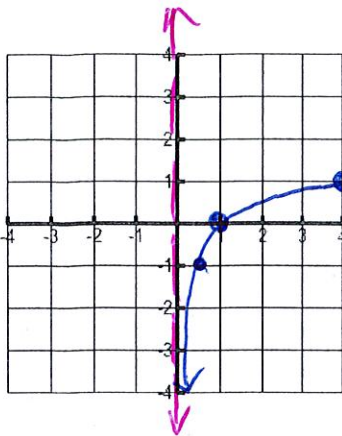


Name: _____

Date: _____

1. $y = \log_4 x$



x	y
1/4	-1
1	0
4	1

State 3 points on Graph $(\frac{1}{4}, -1)$ $(1, 0)$ $(4, 1)$

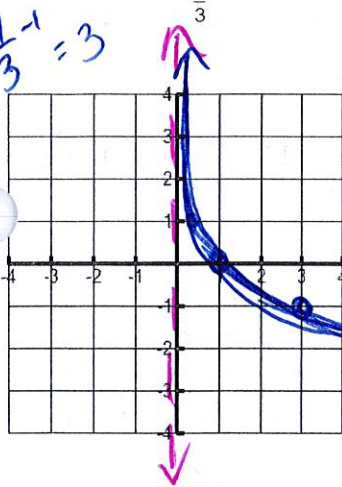
Domain $(0, \infty)$ Range \mathbb{R}

Asymptote $x = 0$ Increasing or Decreasing Increasing

X-intercept $(1, 0)$ Y-intercept none

End Behavior $x \rightarrow 0, f(x) \rightarrow -\infty$
 $x \rightarrow \infty, f(x) \rightarrow \infty$

2. $y = \log_{\frac{1}{3}} x$



$\frac{1}{3}^{-1} = 3$

x	y
3	-1
1	0
1/3	1

State 3 points on Graph $(3, -1)$ $(1, 0)$ $(\frac{1}{3}, 1)$

Domain $(0, \infty)$ Range \mathbb{R}

Asymptote $x = 0$ Increasing or Decreasing

X-intercept $(1, 0)$ Y-intercept none

End Behavior $x \rightarrow 0, f(x) \rightarrow \infty$
 $x \rightarrow \infty, f(x) \rightarrow -\infty$

Transformations:

$y = \log_a(x-h) + k$

* $h \rightarrow$ left/right opposite

* $k \rightarrow$ up/down

* negative outside reflect over $x!$

* negative inside $()$ reflect over $y!$

Examples:

1. $y = \log_a(x+2)$

* left 2

2. $y = \log_a(x) + 5$

* up 5

3. $y = -\log_a(x-1)$

* reflect over x
 * right 1

4. $y = \log_a(-x+3)$

* reflect over y
 * right 3

5. $y = -\log_a(x+2) - 7$

* reflect over x
 * left 2 * down 7

6. $y = \log_a(-x) - 4$

* reflect over y
 * down 4

Asymptote: $x=h$ * # moved left or right!! * # in $()$!!

Examples:

1. $y = \log_a(x+2)$ left 2
 $x = -2$

2. $y = \log_a(x) + 5$
 $x = 0$

3. $y = -\log_a(x-1)$ right 1
 $x = 1$

4. $y = \log_a(-x+3)$ right 3
 $x = 3$

5. $y = -\log_a(x+2) - 7$
 $x = -2$

6. $y = \log_a(-x) - 4$
 $x = 0$

Domain:

Range:

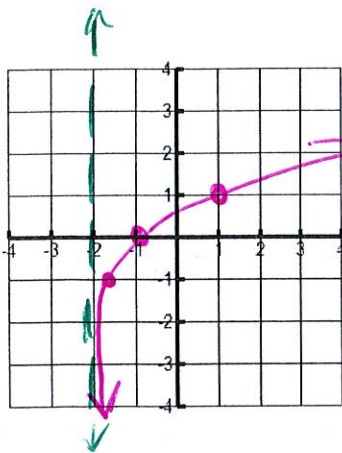
End Behavior:

$(\text{asymptote}, \infty)$
 * reflected across y-axis
 $(-\infty, \text{asym})$

\mathbb{R}
 all the time!

$x \rightarrow \text{Domain values}$
 $f(x) \rightarrow \infty$
 $f(x) \rightarrow -\infty$

3. $y = \log_3(x+2)$



x	y
-2	
$1/3$	-1
1	0
3	1

x	y
-1.67	-1
-1	0
1	1

Transformations: left 2

State 3 points on Graph $(-1.67, -1)(-1, 0)(1, 1)$

Domain $(-2, \infty)$ Range \mathbb{R}

Asymptote $x = -2$ Increasing or Decreasing

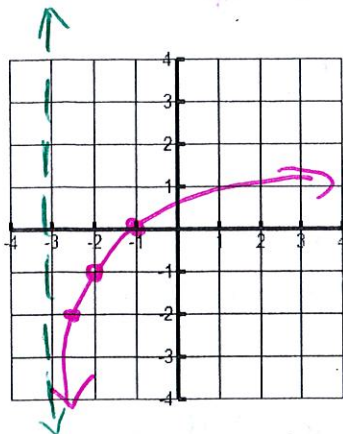
X-intercept $(-1, 0)$ Y-intercept $(0, .631)$

y-int

$y = \log_3(0+2)$
 $y = \log_3 2$

End Behavior
 $x \rightarrow \infty, f(x) \rightarrow \infty$
 $x \rightarrow -2, f(x) \rightarrow -\infty$

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



x	y
-3	
$1/2$	-1
2	0

x	y
-2.5	-2
-2	-1
-1	0

Transformations: left 3, down 1

State 3 points on Graph $(-2.5, -2)(-2, -1)(-1, 0)$

Domain $(-3, \infty)$ Range \mathbb{R}

Asymptote $x = -3$ Increasing or Decreasing

X-intercept $(-1, 0)$ Y-intercept $(0, .585)$

y-int

$y = \log_2 3 - 1$

End Behavior
 $x \rightarrow -3, f(x) \rightarrow -\infty$
 $x \rightarrow \infty, f(x) \rightarrow \infty$