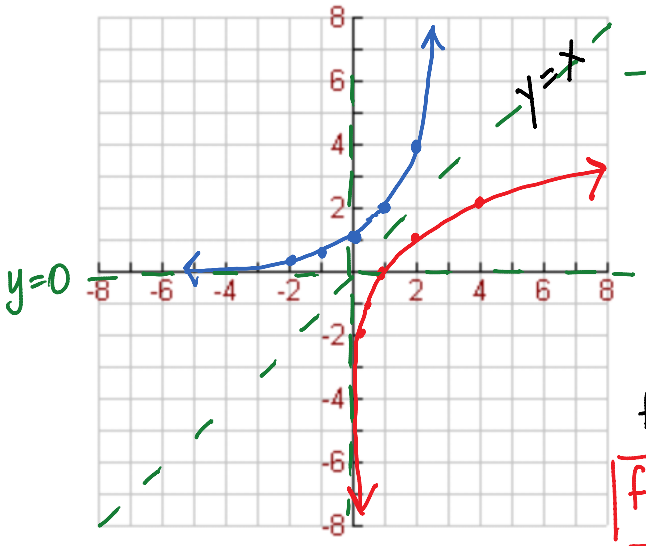
Advanced Algebra w/ Trig
7.4 Logarithms – Day 2

Name: key

1. Graph $f(x) = 2^x$ (No Calculators!!)



x	f(x)
-2	$2^{-2} = \frac{1}{4}$
-1	$\frac{1}{2}$
0	1
1	2
2	4

x	$f^{-1}(x)$
$\frac{1}{4}$	-2
$\frac{1}{2}$	-1
1	0
2	1
4	2

$f(x) = 2^x \rightarrow x = 2^y$

$f^{-1}(x) = \log_2(x)$

2. Now graph the inverse of $f(x) = 2^x$ on the grid above (use a new color & label each graph).

3. Complete the table by using the graphs above:

	$f(x) = 2^x$	$f^{-1}(x) = \log_2(x)$
Domain	$(-\infty, \infty)$	$(0, \infty)$
Range	$(0, \infty)$	$(-\infty, \infty)$
Equation of Asymptote	$y = 0$	$x = 0$

A QUICK SUMMARY OF LOGARITHMS:

For $\log_a x = y \rightarrow$ we go $a^x = y$

EX: Solve for x.

$\log_2 8 = x$

$x = 3$

b/c

$2^3 = 8$

$\log_{81} 9 = x \Rightarrow 81^x = 9$

$x = \frac{1}{2}$

b/c

$81^{\frac{1}{2}} = 9$

Sketch the graph of the following logarithmic functions (graph five reasonably accurate points). Hint: graph the

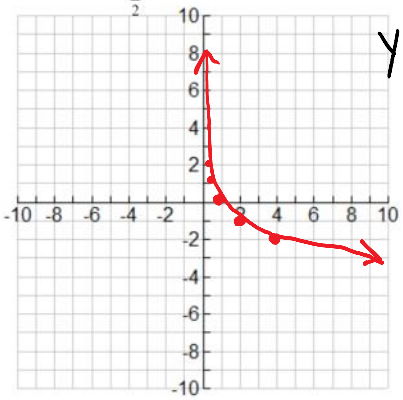
$2^3 = 8$ $\qquad$ $81^{\frac{1}{2}} = 9$

Sketch the graph of the following logarithmic functions (graph five reasonably accurate points). Hint: graph the inverse function first.

1. $g(x) = \log_{\frac{1}{2}}(x)$

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

$y = \left(\frac{1}{2}\right)^x$



x	$f^{-1}(x)$
-2	4
-1	2
0	1
1	1/2
2	1/4

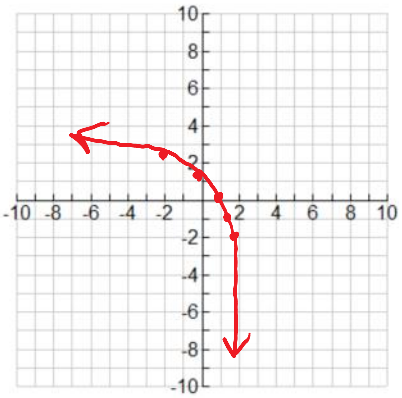
2. $h(x) = \log_2(-x-2)$

$x = \log_2(-y-2)$

$-y - 2 = 2^x$

$-y = 2^x - 2$

$y = -2^x + 2$

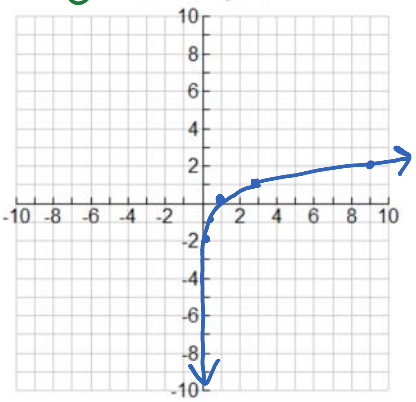


x	$f^{-1}(x)$
-2	7/4
-1	3/2
0	1
1	0
2	-2

Switch back for log

3. $f(x) = \log_3(x)$

for log!



$f^{-1}(x) = 3^x$

$x = \log_3 y$

$3^x = y$

x	$f^{-1}(x)$
-2	$3^{-2} = \frac{1}{9}$
-1	1/3
0	1
1	3
2	9

$f(x) = \log_3 x$

x	$f(x)$
1/9	-2
1/3	-1
1	0
3	1
9	2

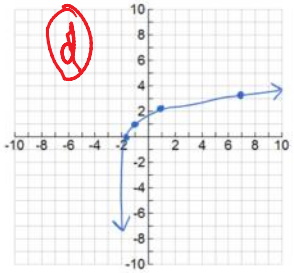
4. Match the functions below with their corresponding graphs. Then state the domain, range and equation of the asymptote.

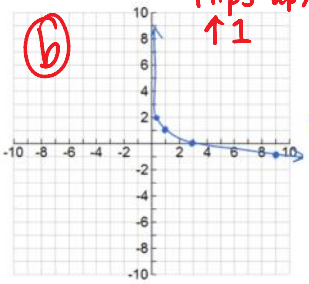
a. $f(x) = \log_3(-x)$ (3)

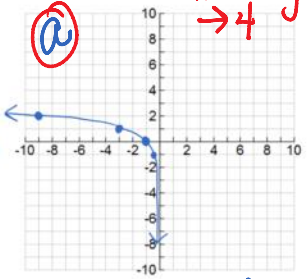
b. $g(x) = -\log_3(x) + 1$ flips up/down ↑1

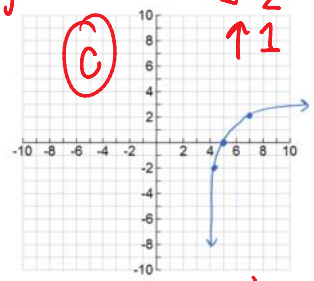
c. $h(x) = 2\log_3(x-4)$ doubling y's →4

d. $j(x) = \log_3(x+2) + 1$ ←2 ↑1









a	b	c	d
Domain: $(-2, \infty)$	Domain: $(0, \infty)$	Domain: $(-\infty, 0)$	Domain: $(4, \infty)$
Range: $\mathbb{R}$	Range: $\mathbb{R}$	Range: $\mathbb{R}$	Range: $\mathbb{R}$
Asymptote: $x = -2$	Asymptote: $x = 0$	Asymptote: $x = 0$	Asymptote: $x = 4$