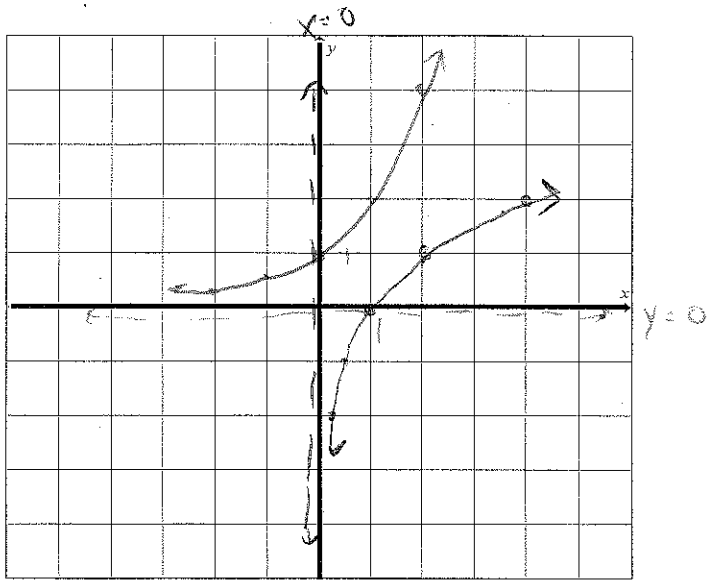
Graphing Logarithmic Functions

Steps:
1. Put into exponential form
2. Use a table of values (for the basic graph) and transformations

Graph each of the following on the same grid:

a) $y = 2^x$

x	y
-2	$\frac{1}{4}$
-1	$\frac{1}{2}$
0	1
1	2
2	4



b) $x = 2^y$

Recall:
Inverses
switch x and y values

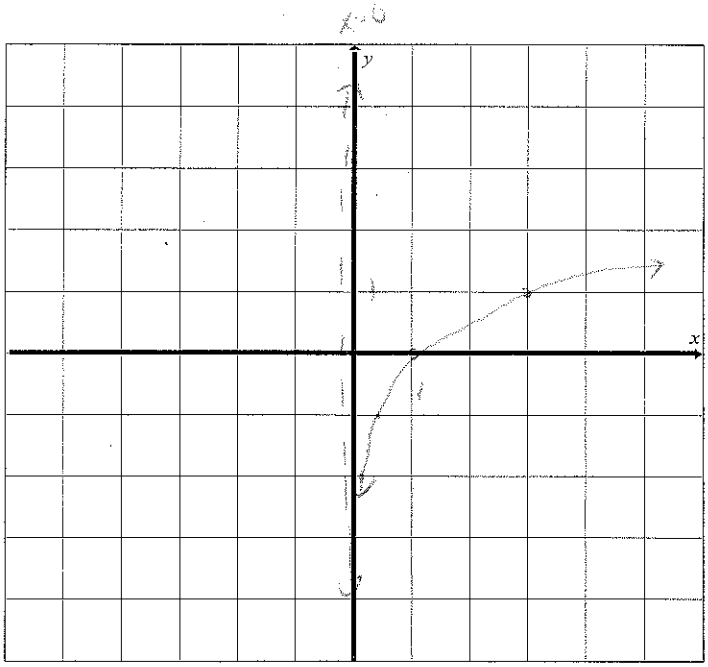
x	y
$\frac{1}{4}$	-2
$\frac{1}{2}$	-1
1	0
2	1
4	2

Example – Bases > 1

Graph: $y = log_3 x$

x	y
$\frac{1}{9}$	-2
$\frac{1}{3}$	-1
1	0
3	1
9	2

$3^y = x$



~~Graph: $y = log_{10} x$~~

Properties:

Domain:

$(0, \infty)$

Range:

$(-\infty, \infty)$

Real zero(es):

1

y-intercept:

none

Asymptote:

$x = 0$

Increasing or Decreasing:

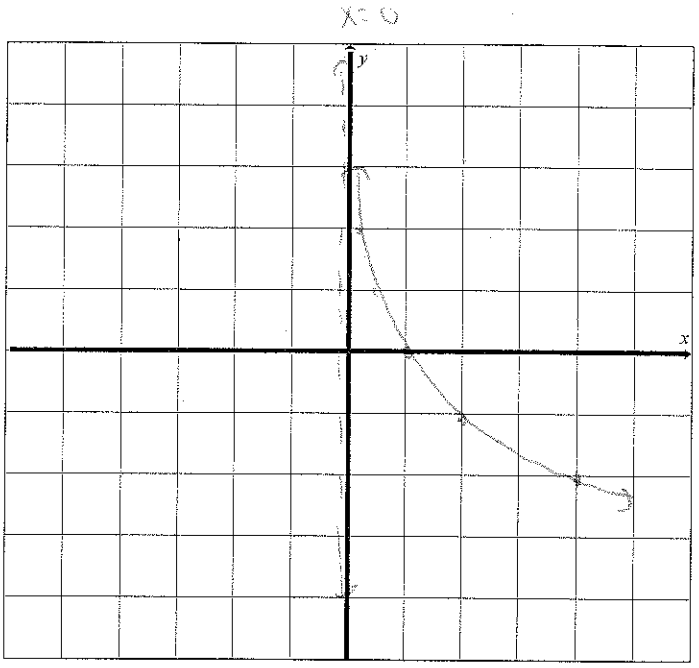
increasing

Example – Bases between 0 and 1 ($0 < b < 1$)

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

x	y
4	-2
2	-1
1	0
$\frac{1}{2}$	1
$\frac{1}{4}$	2

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



~~Graph: $y = log_{\frac{1}{5}}x$~~

Properties:

Domain:

$(0, \infty)$

Range:

$(-\infty, \infty)$

Real zero(es):

1

y-intercept:

none

Asymptote:

$x = 0$

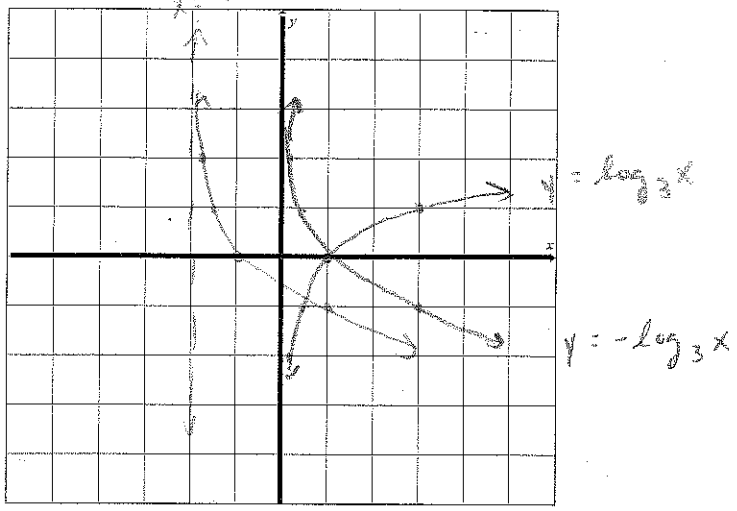
Increasing or Decreasing:

decreasing

Graphing Logs Using Transformations

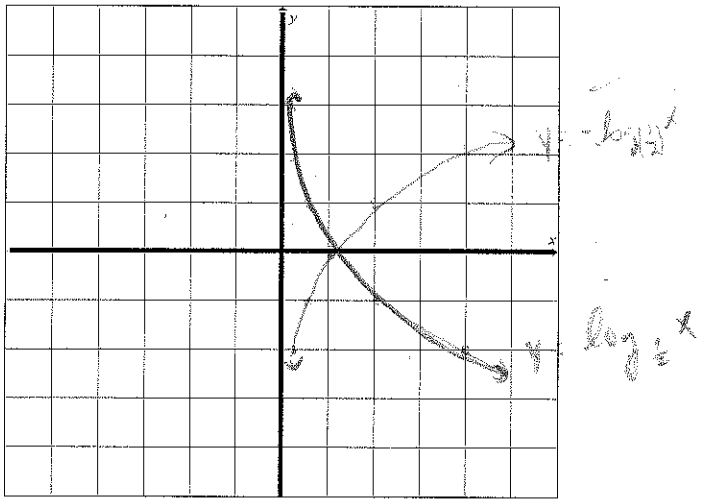
a) Graph: $y = -log_3(x+2)$

$3^y = x$



b) $y = -log_{\frac{1}{2}}x$

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



c) $y = log_3\left(\frac{1}{2}x\right) + 2$

$3^{y-2} = x$