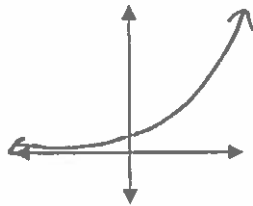


Graphs of Exponential and Log Functions Notes

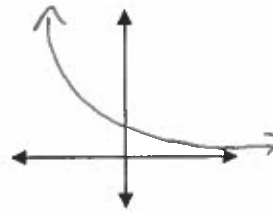
There is not really ONE parent function of an exponential function – it depends on what the base is. There are, however, two main types of graphs:

Exponential Growth Function:



Domain: $(-\infty, \infty)$
Range: $(0, \infty)$

Exponential Decay Function:

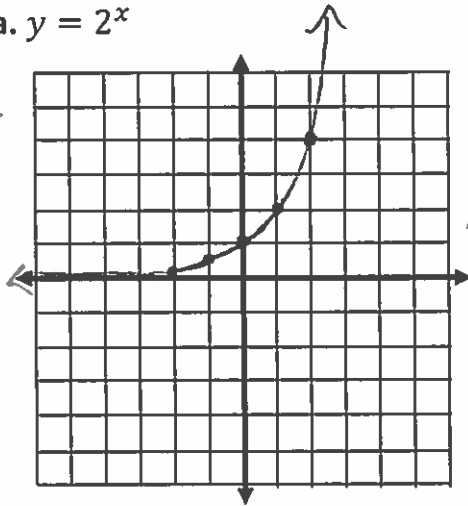


Domain: $(-\infty, \infty)$
Range: $(0, \infty)$

Example 1 ... Graph the exponential functions. State the domain, range, and asymptote.

a. $y = 2^x$

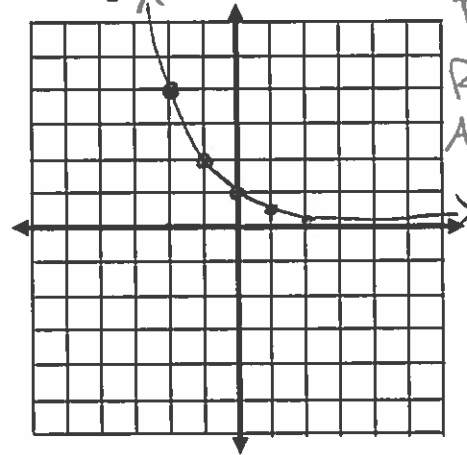
x	y
-2	$\frac{1}{4}$
-1	$\frac{1}{2}$
0	1
1	2
2	4



D: $(-\infty, \infty)$
R: $(0, \infty)$
Asymp: $y = 0$

b. $y = (\frac{1}{2})^x$

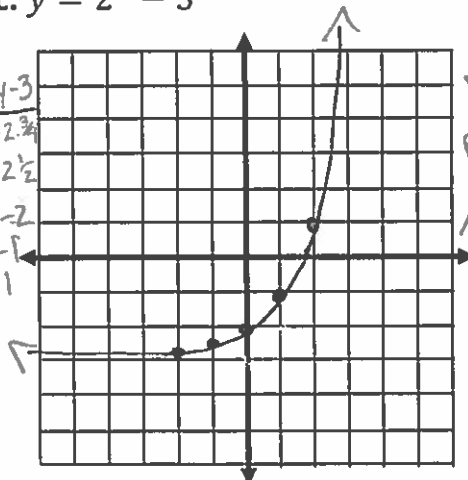
x	y
-2	4
-1	2
0	$\frac{1}{2}$
1	$\frac{1}{4}$
2	$\frac{1}{8}$



D: $(-\infty, \infty)$
R: $(0, \infty)$
Asymp: $y = 0$

c. $y = 2^x - 3$

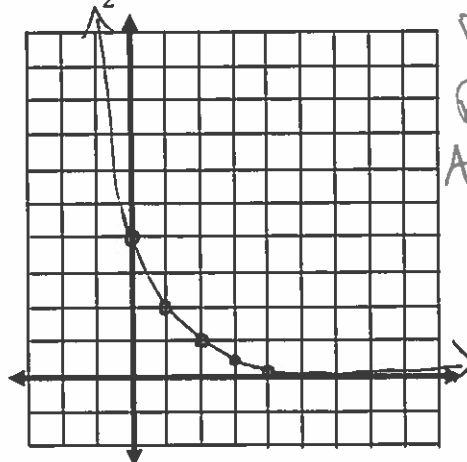
x	y = 2^x	y - 3
-2	$\frac{1}{4}$	$-2\frac{3}{4}$
-1	$\frac{1}{2}$	$-2\frac{1}{2}$
0	1	-2
1	2	-1
2	4	1



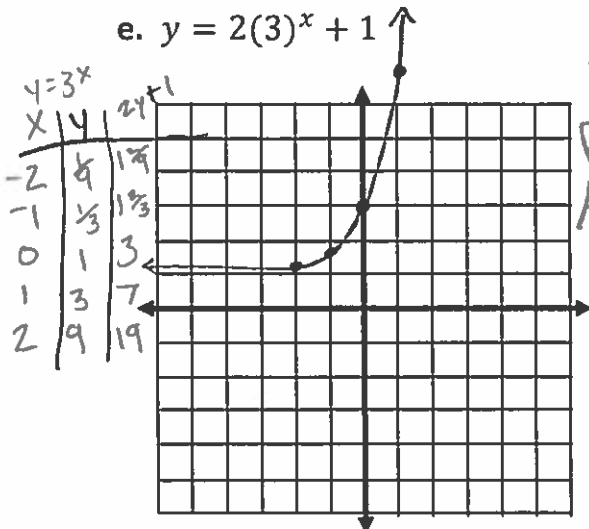
D: $(-\infty, \infty)$
R: $(-3, \infty)$
Asymp: $y = -3$

d. $y = (\frac{1}{2})^{x-2}$

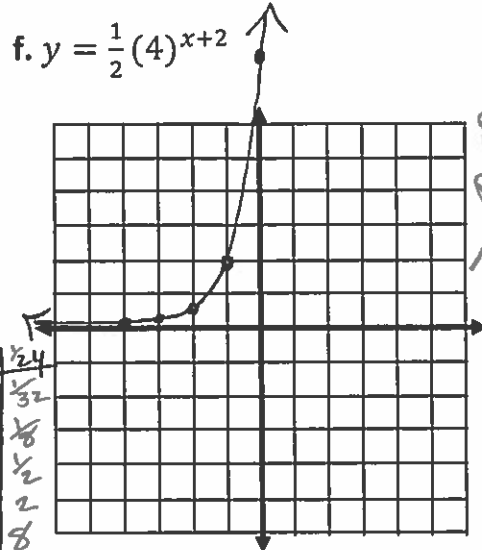
x+2	x	y = (1/2)^x
0	-2	4
1	-1	2
2	0	$\frac{1}{2}$
3	1	$\frac{1}{4}$
4	2	$\frac{1}{8}$



D: $(-\infty, \infty)$
R: $(0, \infty)$
Asymp: $y = 0$



$D: (-\infty, \infty)$
 $R: (1, \infty)$
 Asymp: $y = 1$



$D: (-\infty, \infty)$
 $R: (0, \infty)$
 Asymp: $y = 0$

$y = 4^x$

x	y
-2	$\frac{1}{16}$
-1	$\frac{1}{4}$
0	1
1	4
2	16

Logarithmic Graphs Notes

A logarithmic (log) function is the INVERSE of an exponential function. In other words, if you had a variable in the exponent and were trying to solve for that variable, you may use a log function in the solving process.

Example 1... Convert each log function to an exponential function.

a. $y = \log_2 x$
 n b m

$$2^y = x$$

b. $y = \log_3 x + 2$
 -2 -2

$$y - 2 = \log_3 x$$

$$3^{y-2} = x$$

c. $y = \log_4(x + 2) - 3$
 $+3$ $+3$

$$y + 3 = \log_4(x + 2)$$

$$4^{y+3} = x + 2$$

$$4^{y+3} - 2 = x$$

Example 2... Describe the transformations of each log function.

a. $y = \log_8(x + 5) - 4$

left 5
down 4

b. $y = 2 \log_2(x - 7)$

vert. stretch of 2
right 7

c. $y = -\log_5 x - 1$

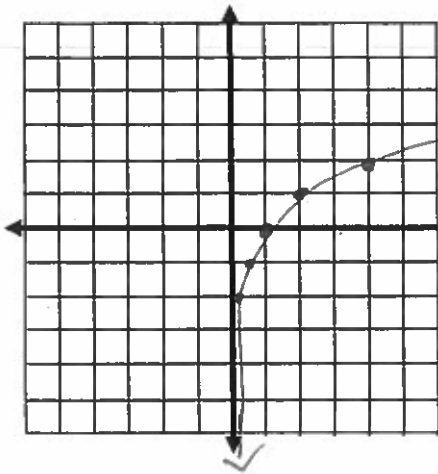
reflect over x-axis
down 1

Example 3... Graph each logarithmic function. State the domain, range and asymptote.

a. $y = \log_2 x$

$2^y = x$

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

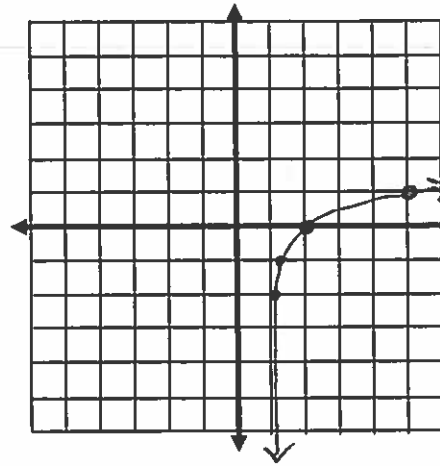


D: $(0, \infty)$
 R: $(-\infty, \infty)$
 Asymp: $x=0$

b. $y = \log_4(x-1)$

$4^y = x$

x+1	x	y
$\frac{1}{16}$	$\frac{1}{16}$	-2
$\frac{1}{4}$	$\frac{1}{4}$	-1
2	1	0
5	4	1
17	16	2

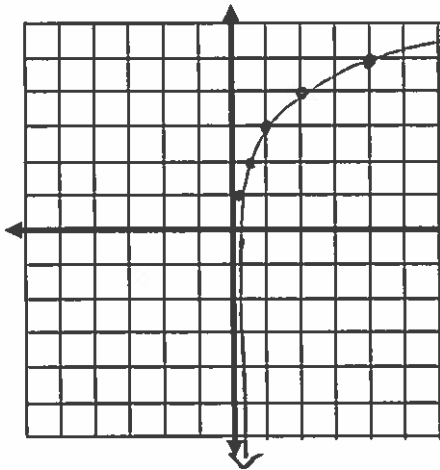


D: $(1, \infty)$
 R: $(-\infty, \infty)$
 Asymp: $x=1$

c. $y = \log_2(x) + 3$

$2^y = x$

x	y	y+3
$\frac{1}{4}$	-2	1
$\frac{1}{2}$	-1	2
1	0	3
2	1	4
4	2	5

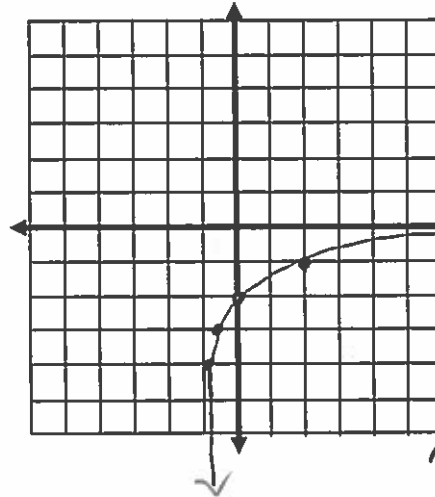


D: $(0, \infty)$
 R: $(-\infty, \infty)$
 Asymp: $x=0$

d. $y = \log_3(x+1) - 2$

$3^y = x$

x-1	x	y	y-2
$\frac{1}{81}$	$\frac{1}{81}$	-2	-4
$\frac{1}{9}$	$\frac{1}{9}$	-1	-3
0	1	0	-2
2	3	1	-1
8	9	2	0



D: $(-1, \infty)$
 R: $(-\infty, \infty)$
 Asymp: $x=-1$