

8.1 - 8.2 Part 1 Graphing Exponential Growth & Decay Functions

An exponential function has the variable as an exponent.

$$f(x) = a \cdot b^x$$

base
exponent

b is any positive number other than 1

examples: $f(x) = 2^x$ or $f(x) = \left(\frac{1}{2}\right)^x$

Example 1

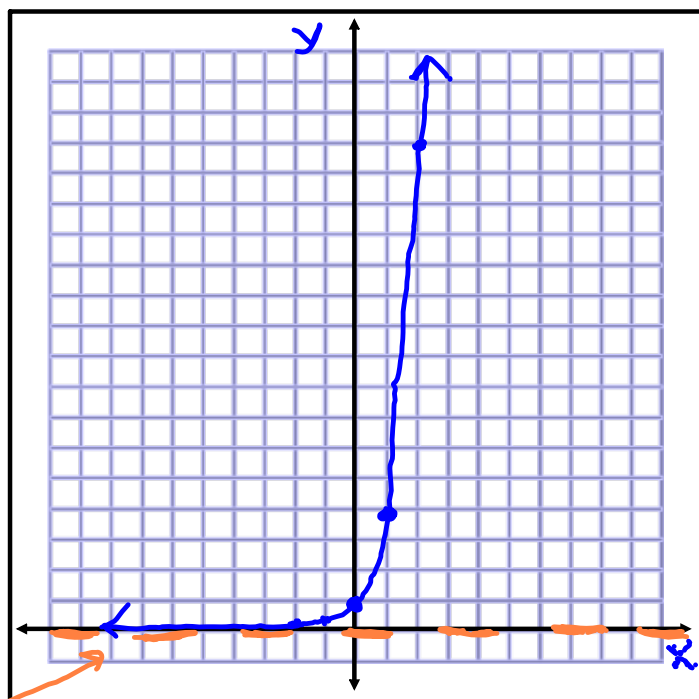
Make a table of values and graph $y = 4^x$

x	y
-2	.0625
-1	.25
0	1
1	4
2	16

Domain: \mathbb{R}

Range: $y > 0$
(above asym.)

Asymptote: $y = 0$



Example 2

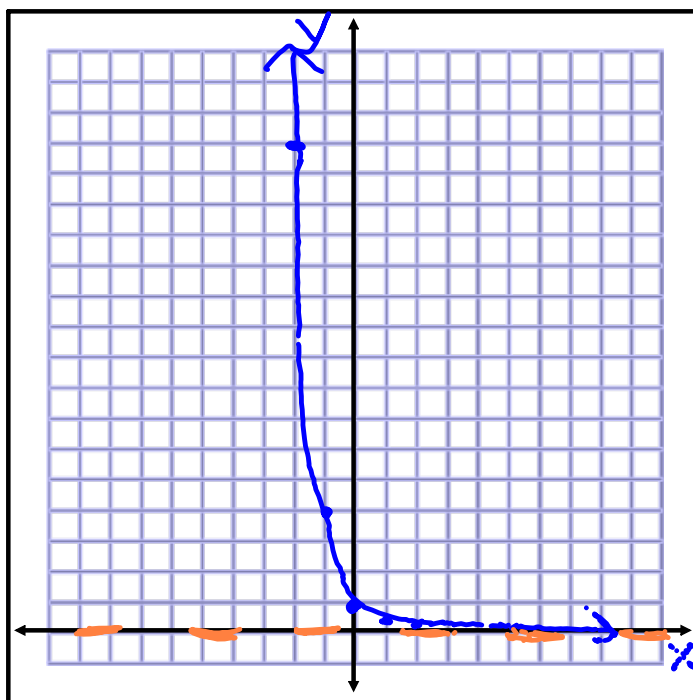
Make a table of values and graph $y = \left(\frac{1}{4}\right)^x + 0$

x	y
-2	16
-1	4
0	1
1	.25
2	.0625

Domain: \mathbb{R}

Range: $y > 0$

Asymptote: $y = 0$



The exponential function is a growth function if the base is greater than 1.

The exponential function is a decay function if the base is between 0 and 1.

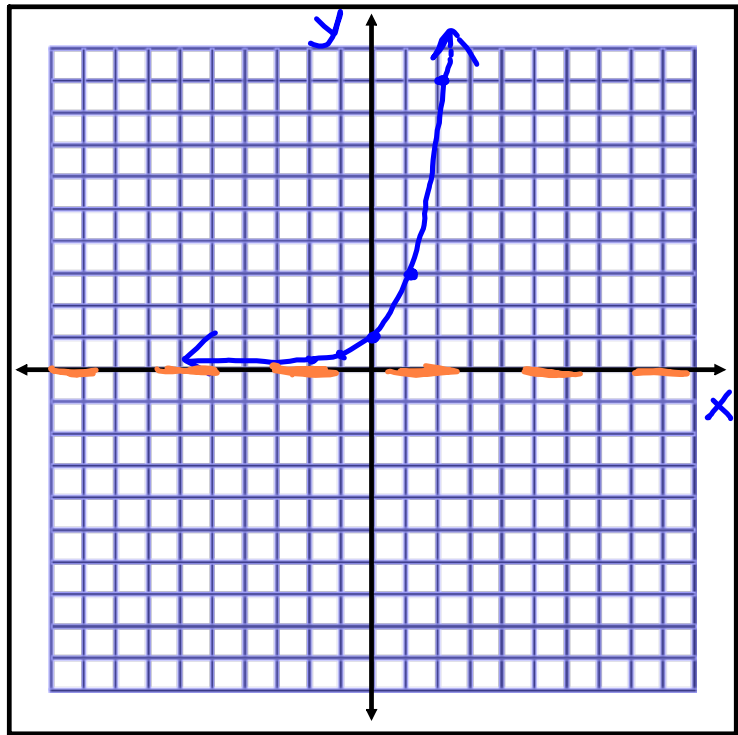
Example 3

Graph the function below. Identify the domain, range, & asymptote.

\mathbb{R} $y > 0$ $y = 0$

$$y = 3^x + 0$$

x	y
-2	.111
-1	.333
0	1
1	3
2	9



Example 4

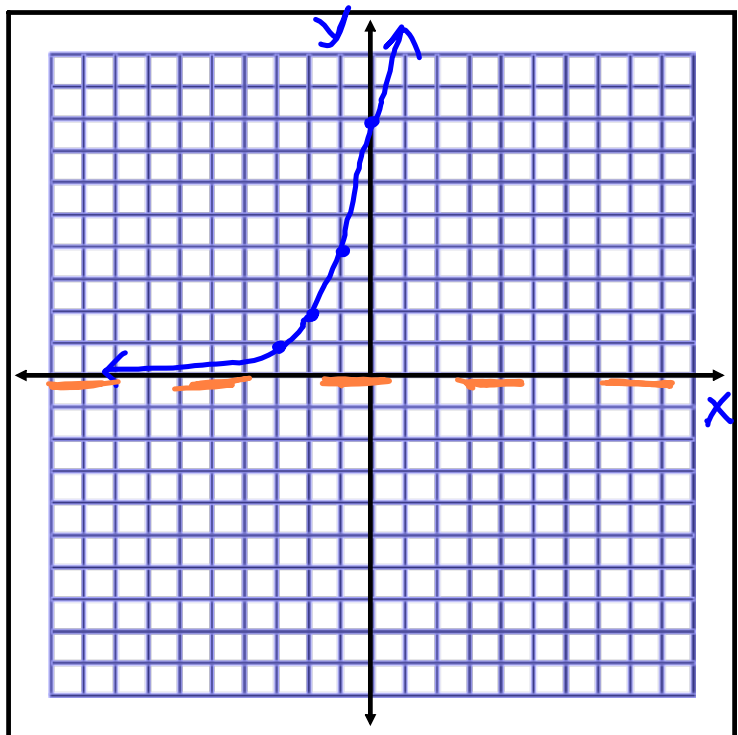
Graph the function below. Identify the domain, range, & asymptote.

\mathbb{R} $y > 0$ $y = 0$

$$y = 4(2)^{x+1} + 0$$

$x + y = 0$
 $x = -1$

x	y
-3	1
-2	2
-1	4
0	8
1	16



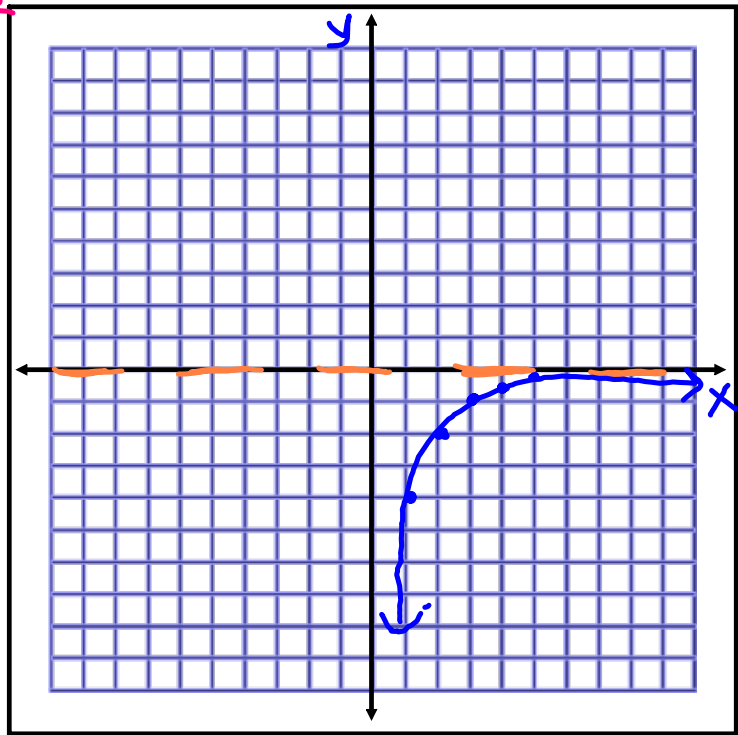
Example 5

Graph the function below. Identify the domain, range, & asymptote.

$$y = -\left(\frac{1}{2}\right)^{x-3} + 0$$

$x - y = 0$
 $\frac{+3}{+3} \quad \frac{+3}{+3}$
 $x = 3$

x	y
1	-4
2	-2
3	-1
4	-0.5
5	-0.25



Example 6

Graph the function below. Identify the domain, range, & asymptote.

$$y = -2\left(\frac{1}{3}\right)^{x+5} + 8$$

$x + 5 = 0$
 $\frac{-5}{-5} \quad \frac{-5}{-5}$
 $x = -5$

x	y
-3	7.77
-4	7.33
-5	6
-6	2
-7	-10

