$y = a(b)^x$

$y = 2^x$

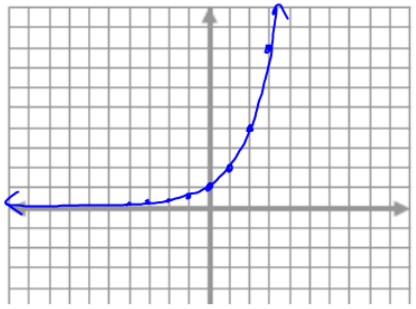
$y = 1(2)^x$

1. Sketch the graph of $y = 2^x$. Then state the function's domain and range.

Domain: all real numbers

Range: $y > 0$ / all positive numbers

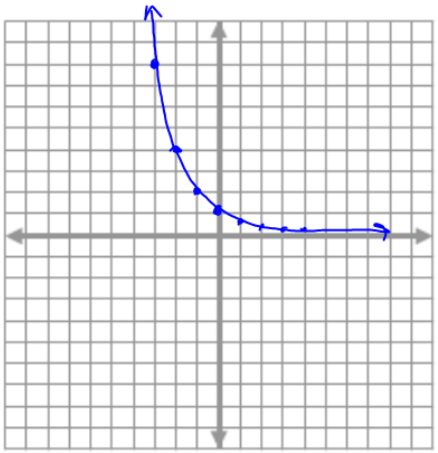
X	Y
-4	$\frac{1}{16}$
-3	$2^{-3} = \frac{1}{2^3} = \frac{1}{8}$
-2	$2^{-2} = \frac{1}{2^2} = \frac{1}{4}$
-1	$2^{-1} = \frac{1}{2}$
0	1
1	2
2	4
3	8
4	16



2. Sketch the graph of $y = \left(\frac{1}{2}\right)^x$. Then state the function's domain and range.

Domain: all real numbers

Range: $y > 0$



X	Y
-4	$\left(\frac{1}{2}\right)^{-4} = \frac{1^{-4}}{2^{-4}} = \frac{2^4}{1^4} = 16$
-3	$\left(\frac{1}{2}\right)^{-3} = 8$
-2	4
-1	2
0	1
1	$\left(\frac{1}{2}\right)^1 = \frac{1}{2}$
2	$\left(\frac{1}{2}\right)^2 = \frac{1^2}{2^2} = \frac{1}{4}$
3	$\frac{1}{8}$
4	$\frac{1}{16}$

$y = a(b)^x$, $a \neq 0$, $b > 0$, $b \neq 1$

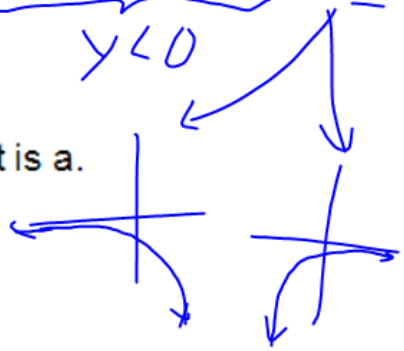
1. The function is continuous

2. The domain is the set of all real numbers

3. The x-axis is an asymptote of the graph

a line that a graph approaches but never touches/crosses

4. The range is the set of $\underbrace{\text{all positive numbers}}_{y>0}$ if $a>0$ and $\underbrace{\text{all negative numbers}}_{y<0}$ if $a<0$



5. The graph contains the point $(0,a)$. The y-intercept is a.

$y = a(b)^x$

$a(b)^0$

If a>0 and b>1, the function $y = a(b)^x$ represents exponential __growth__

If a>0 and 0<b<1, the function $y = a(b)^x$ represents exponential __decay__

1. $y = \left(\frac{1}{5}\right)^x$

   $a = 1$
   $b = \frac{1}{5}$ decay

2. $y = 2(5)^x$ growth

3. $y = 7(0.8)^x$ decay

4. $y = 4\left(\frac{3}{2}\right)^x$ growth

5. $y = -6(4)^x$

   neither