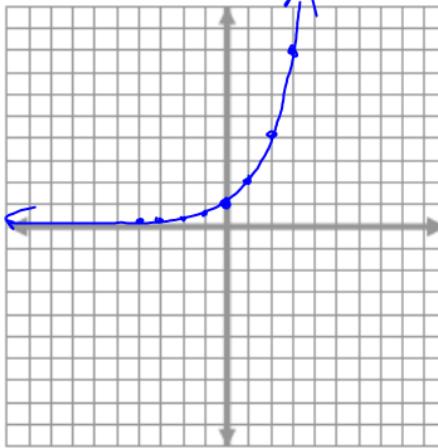


1. Sketch the graph of  $y = 2^x$ . Then state the function's domain and range.

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

Domain: all real numbers

Range:  $y > 0$  all positive numbers



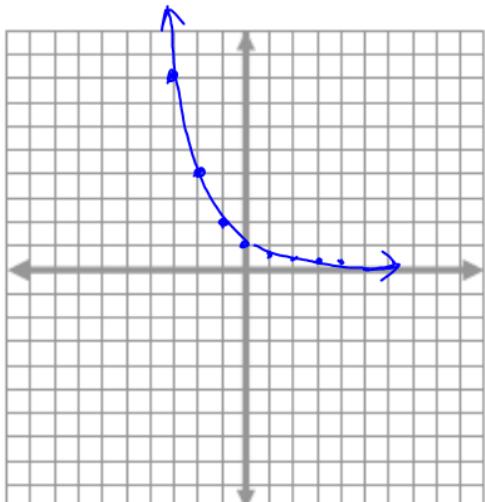
$$Y = a(b)^x$$

$$Y = 1(2)^x$$

$\downarrow$   
 $a=1$

$\downarrow$   
 $b$

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



Dom: all real numbers  
Range:  $y > 0$

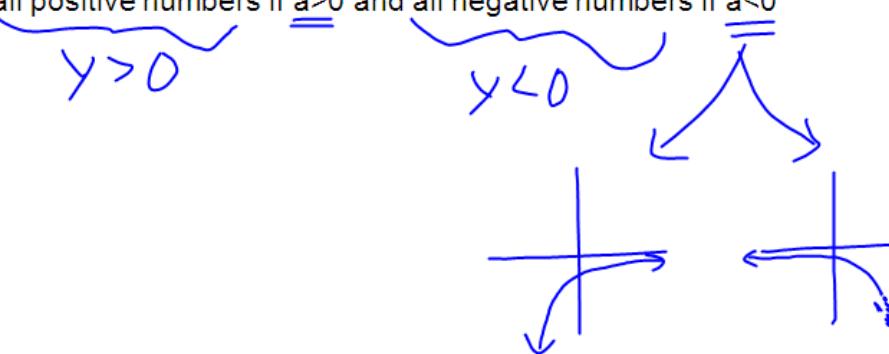
X	Y
-4	$\left(\frac{1}{2}\right)^{-4} = \frac{1^{-4}}{2^{-4}} = \frac{2^4}{1^4} = 16$
-3	$\left(\frac{1}{2}\right)^{-3} = \frac{1^{-3}}{2^{-3}} = \frac{2^3}{1^3} = 8$
-2	4
-1	2
0	1
1	$\left(\frac{1}{2}\right)^1 = \frac{1}{2}$
2	$\left(\frac{1}{2}\right)^2 = \frac{1^2}{2^2} = \frac{1}{4}$
3	$\frac{1}{8}$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

$\downarrow$   
a line that a graph approaches  
but never touches/crosses

4. The range is the set of all positive numbers if  $a > 0$  and all negative numbers if  $a < 0$



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

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

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

$$\begin{aligned} a &= 1 \\ b &= \frac{1}{5} \end{aligned}$$

decay

$$\textcircled{2} \quad y = 2(5)^x$$

$$\begin{aligned} a &= 2 \\ b &= 5 \end{aligned}$$

growth

$$\textcircled{3} \quad y = 7(0.8)^x$$

decay

$$y = -7\left(\frac{1}{2}\right)^x$$

neither

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

growth

## Property of Equality for Exponential Functions

If  $\underline{\underline{2^x}} = \underline{\underline{2^8}}$ , then  $x = 8$

$$\textcircled{1} \quad \underline{\underline{3^{2n+1}}} = \underline{\underline{3^4}}$$

$$\downarrow \\ 2n+1 = 4$$

$$\begin{aligned} 2n &= 3 \\ n &= \frac{3}{2} \end{aligned}$$

$$\textcircled{2} \quad \underline{\underline{2^{4x}}} = \underline{\underline{2^{3(x-1)}}}$$

$$4x = 3x - 3$$

$$\textcircled{x = -3}$$

## Property of Inequality for Exponential Functions

If  $\underline{\underline{2^x}} > \underline{\underline{2^8}}$ , then  $x > 8$

$$\textcircled{1} \quad \underline{\underline{3^{2n+1}}} \leq \underline{\underline{3^4}}$$

$$2n+1 \leq 4$$

$$2n \leq 3$$

$$\textcircled{n \leq \frac{3}{2}}$$

$$\textcircled{3} \quad \underline{\underline{5^{3x+6}}} \geq \underline{\underline{5^{5x}}}$$

$$3x+6 \geq 5x$$

$$6 \geq 2x$$

$$\textcircled{3 \geq x}$$

$$\textcircled{x \leq 3}$$

1-7, 12-17