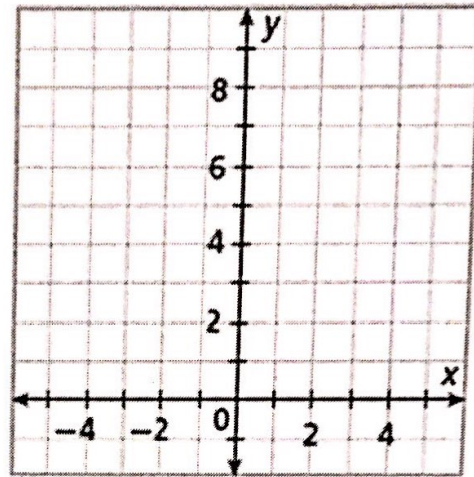


Math 3: Graphing Exponential and Logarithmic Functions:

Graph $f(x) = 2^x$. Complete the table below. Graph the points and connect with a smooth curve.

x	$f(x) = 2^x$
-3	$2^{-3} = \frac{1}{2^3} = \frac{1}{8}$
-2	
-1	
0	
1	
2	
3	



What is the domain?

Does it ever cross (or touch) the x-axis?

Does it ever cross the y-axis?

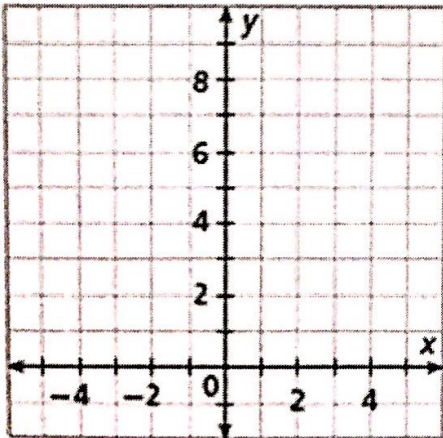
The graph should be approaching a horizontal line, called a **horizontal asymptote**. What is the equation of that line?

What is the range?

So, x-intercept = _____

So, y-intercept = _____

2. Now graph $f(x) = (1/2)^x$



Domain:

Range:

Asymptote:

In general, exponential functions have form $y = a(b)^x$

If $b > 1$, then _____

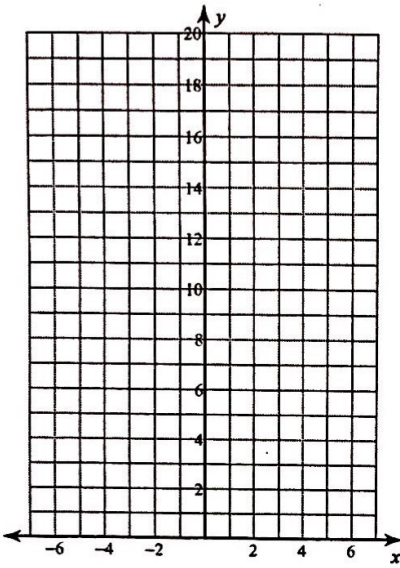
$0 < b < 1$, then _____

Exponential functions are monotonic meaning:

Graphing Exponential Functions

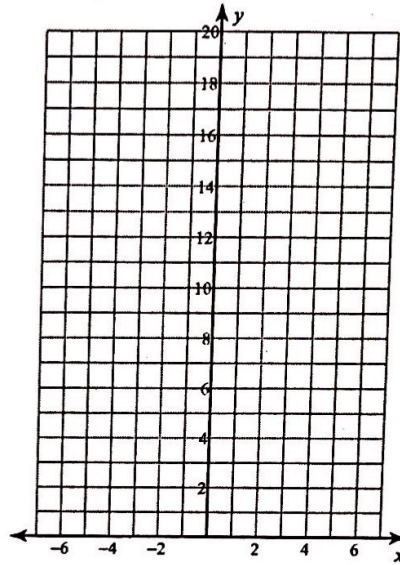
Sketch the graph of each function.

1) $y = 4 \cdot 2^x$



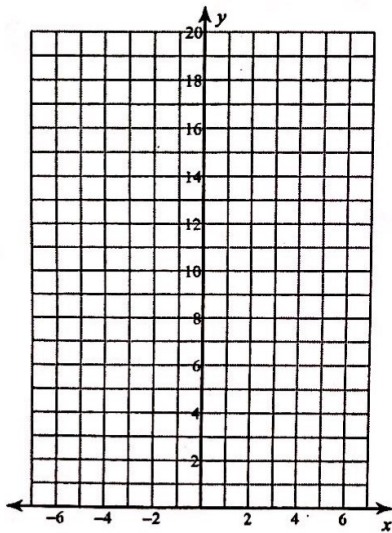
domain:
range:
Horiz. A:

2) $y = 2^x + 3$



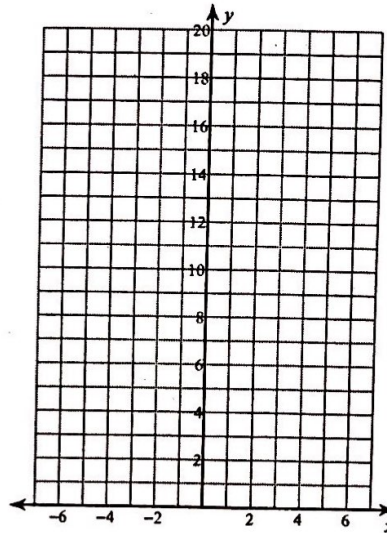
domain:
range:
Horiz. A:

3) $y = 4 \cdot \left(\frac{1}{2}\right)^x$



d:
r:
HA:

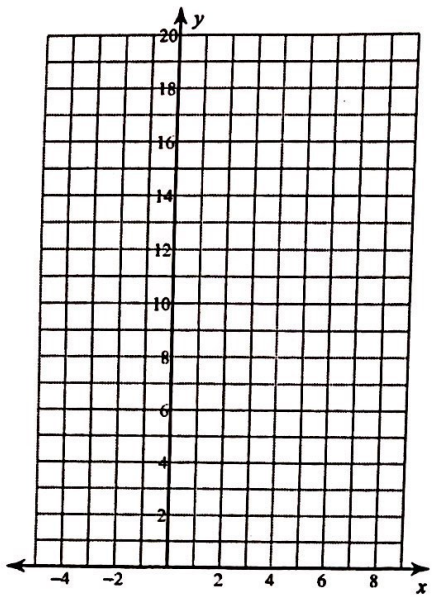
4) $y = \left(\frac{1}{2}\right)^x + 1$



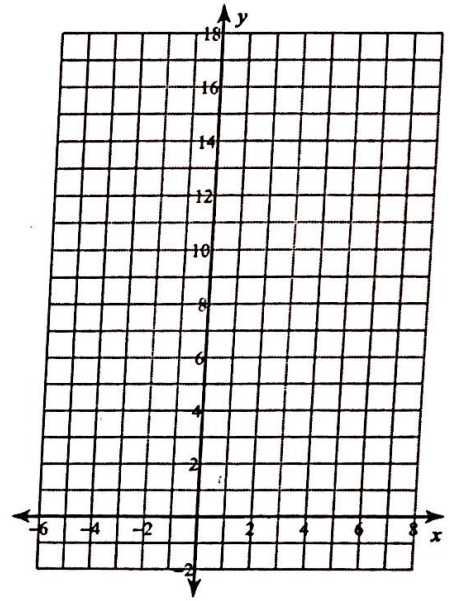
d:
r:
HA:
-1-

* Describe transformation & graph

5) $y = 2 \cdot 2^{x-2} + 2$

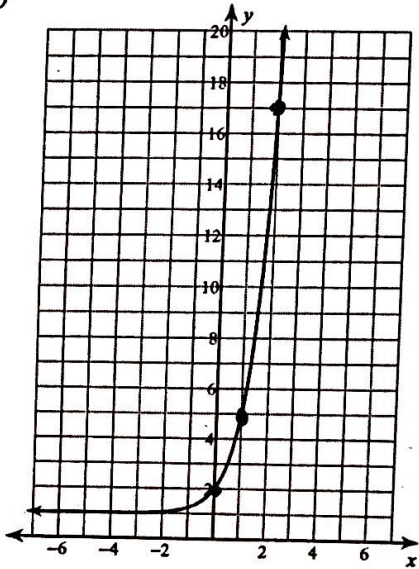


6) $y = \left(\frac{1}{2}\right)^{x-1} - 2$

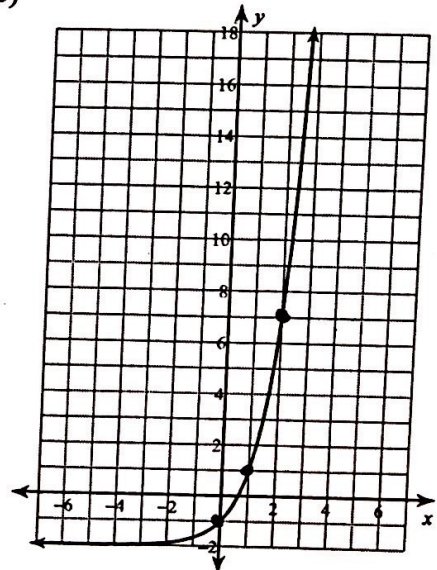


Write an equation for each graph.

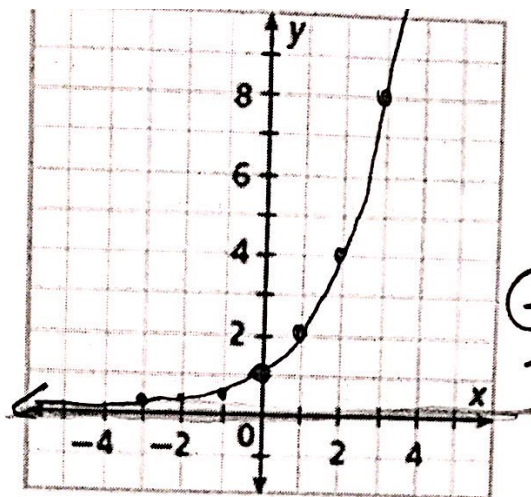
7)



8)



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



Growth

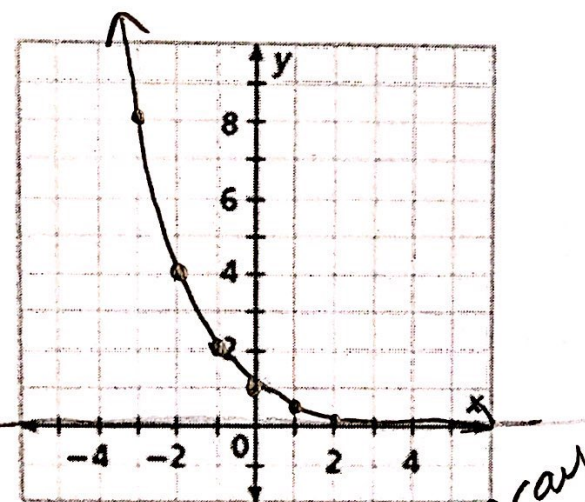
What is the domain? $(-\infty, \infty)$

Does it ever cross (or touch) the x-axis? No

Does it ever cross the y-axis? Yes

The graph should be approaching a horizontal line, called a **horizontal asymptote**. What is the equation of that line?

Now graph $f(x) = (1/2)^x = 2^{-x}$ $(\frac{1}{2})^{-2} = 2^2 = 4$ $y=0$



Decay

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

Asymptote: Horiz asymptote @ $y=0$

decr $(-\infty, \infty)$

In general, exponential functions have form $y = a(b)^x$

If $b > 1$, then growth

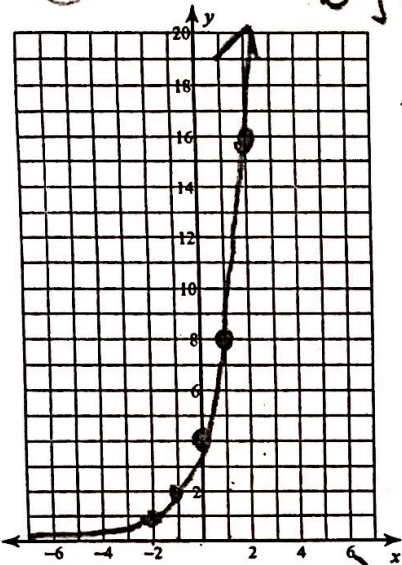
$0 < b < 1$, then decay

Exponential functions are monotonic meaning: strictly increasing (growth) or strictly decreases (decay)

Graphing Exponential Functions

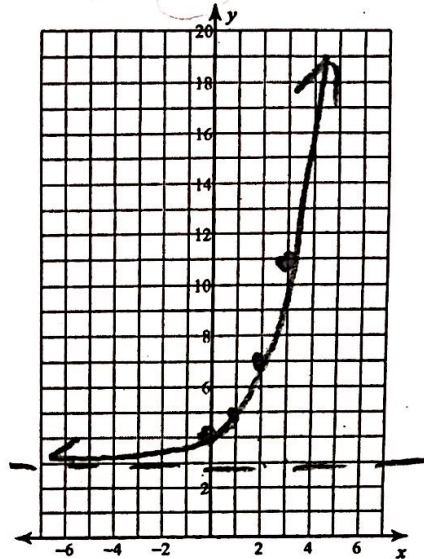
Sketch the graph of each function.

1) $y = 4 \cdot 2^x$ → mult + y val. by 4



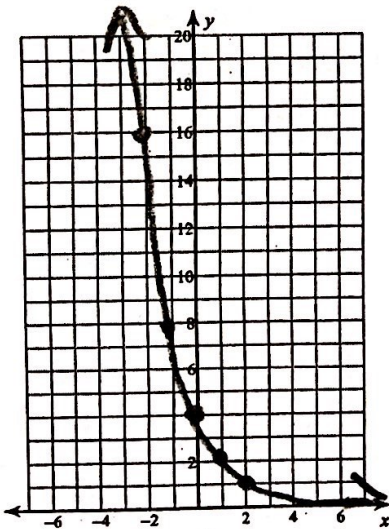
domain: $(-\infty, \infty)$
 range: $(0, \infty)$
 Horiz. A: $y = 0$

2) $y = 2^x + 3$ ← moves up 3



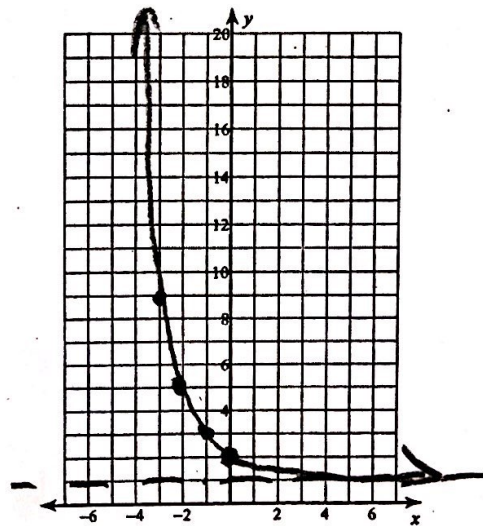
domain: $(-\infty, \infty)$
 range: $[3, \infty)$
 Horiz. A: $y = 3$

3) $y = 4 \cdot \left(\frac{1}{2}\right)^x$



d: $(-\infty, \infty)$
 r: $(0, \infty)$
 HA: $y = 0$

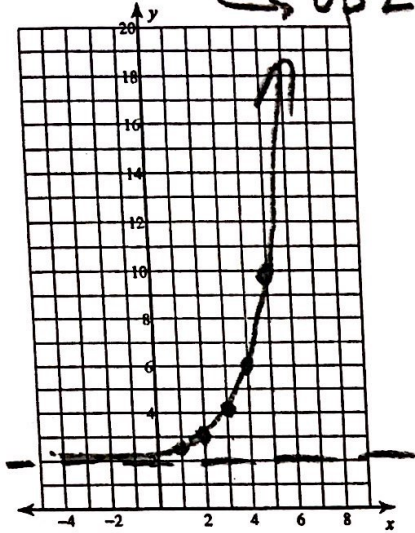
4) $y = \left(\frac{1}{2}\right)^x + 1$



d: $(-\infty, \infty)$
 r: $(1, \infty)$
 HA: $y = 1$

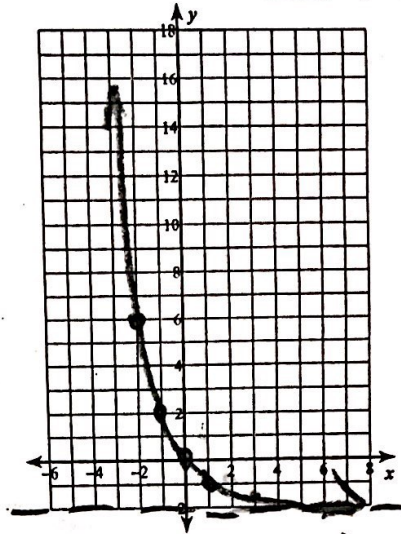
* Describe transformation & graph

5) $y = 2^{x-2} + 2$
 → rt. 2
 → up 2



d: $(-\infty, \infty)$
 r: $(2, \infty)$
 HA: $y = 2$

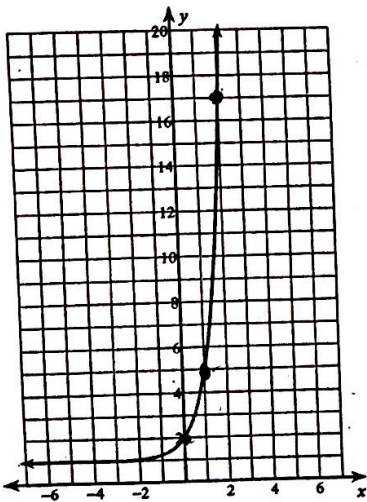
6) $y = \left(\frac{1}{2}\right)^{x-1} - 2$
 → rt 1
 → down 2



d: $(-\infty, \infty)$
 r: $(-2, \infty)$
 HA $y = -2$

Write an equation for each graph.

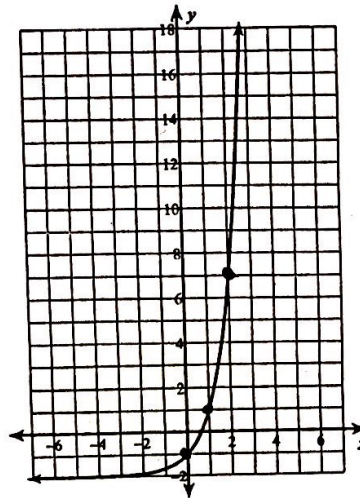
7)



$y = 4^x + 1$

x	y
0	2
1	5
2	17

8)



$y = 3^x - 2$

x	y
0	-1
1	1
2	7