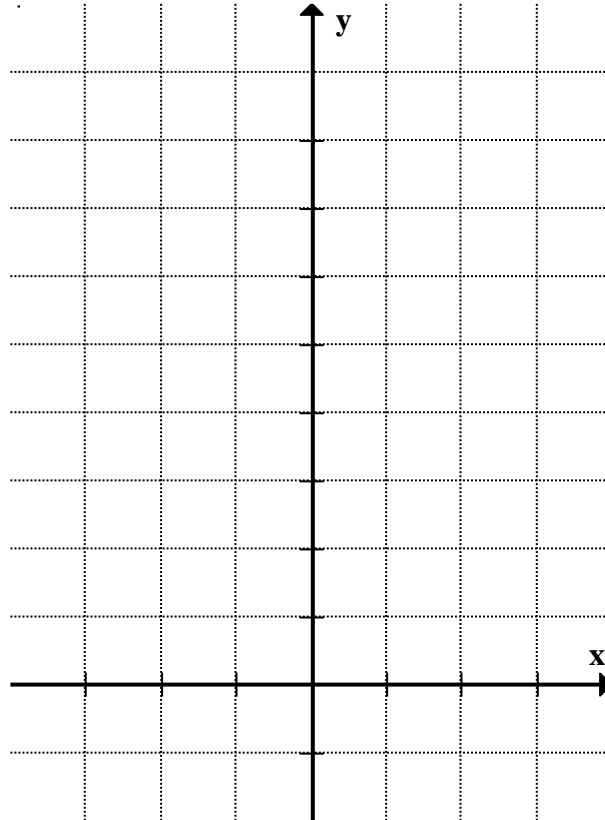


In these exercises, you will be investigating the properties of exponential functions of the form $y = Cb^x$, with $b > 0$, $b \neq 1$

1a) Complete the tables of ordered pairs and sketch on the same set of axes $y = 2^x$ and $y = 3^x$. Indicate the domain, range, intercept(s), and asymptote(s) of each function.

x	$y = 2^x$
-3	
-2	
-1	
0	
1	
2	
3	



x	$y = 3^x$
-3	
-2	
-1	
0	
1	
2	
3	

Domain: _____
 Range: _____
 Intercept(s): _____
 Asymptote(s): _____

Domain: _____
 Range: _____
 Intercept(s): _____
 Asymptote(s): _____

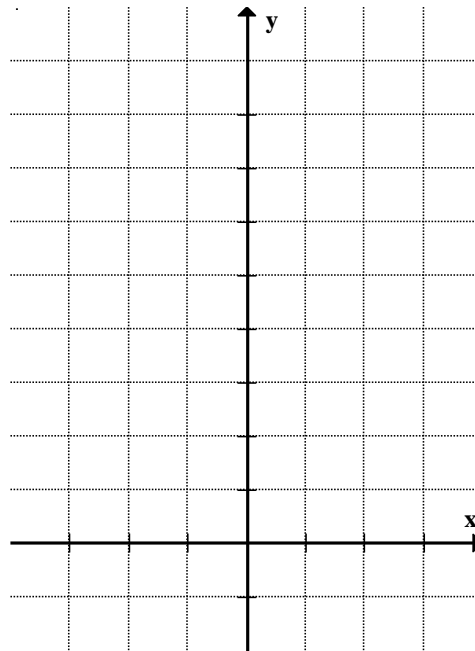
b) Write a few sentences summarizing the similarities and differences between the two graphs.

c) Write a few sentences describing what you think the graphs of $y = 5^x$ and $y = 2.5^x$ will look like. Indicate how these graphs differ from those above. Verify your hypotheses by graphing the functions on your calculator.

2a) Complete the tables of ordered pairs and sketch on the same set of axes $y = \left(\frac{1}{2}\right)^x$ and $y = \left(\frac{1}{3}\right)^x$. Indicate the domain, range, intercept(s), and asymptote(s) of each function.

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

Domain: _____
 Range: _____
 Intercept(s): _____
 Asymptote(s): _____



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

Domain: _____
 Range: _____
 Intercept(s): _____
 Asymptote(s): _____

b) Write a few sentences summarizing the similarities and differences between the two graphs.

c) Write a few sentences describing what you think the graphs of $y = \left(\frac{1}{10}\right)^x$ and $y = (0.6)^x$ will look like. Indicate how these graphs differ from those above. Verify your hypotheses by graphing the functions on your calculator.

d) Write a few sentences describing the general behavior of $y = b^x$ when $b > 1$.

e) Write a few sentences describing the general behavior of $y = b^x$ when $0 < b < 1$.

f) Write a few sentences describing through transformations how $y = 2^x$ (from #1) relates to $y = \left(\frac{1}{2}\right)^x$ (from #2). Relate the bases from both equations by rewriting them with the same base and explain how that relates to the transformation.

Since we know the effect of the value a on the graph of $y = b^x$, let's fix a value of b , say $b = 2$, and investigate the effect of the constant C on the graph of $y = C b^x$.

3a) Complete the tables of ordered pairs and sketch on the same set of axes $y = 2^x$, $y = 3(2^x)$, $y = 0.5(2^x)$ and $y = -3(2^x)$. Indicate the domain, range, intercept(s), and asymptote(s) of each function.

x	$y = 2^x$
-3	
-2	
-1	
0	
1	
2	
3	

Domain: _____
 Range: _____
 Intercept(s): _____
 Asymptote(s): _____

x	$y = 0.5(2^x)$
-3	
-2	
-1	
0	
1	
2	
3	

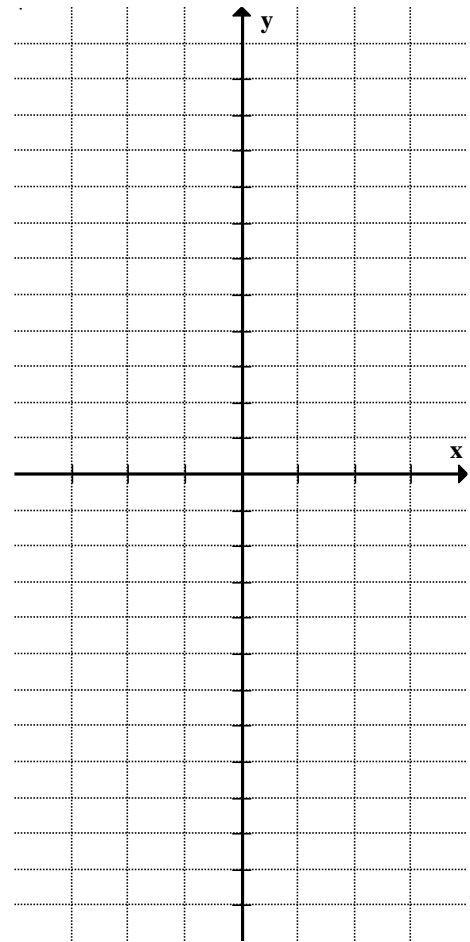
Domain: _____
 Range: _____
 Intercept(s): _____
 Asymptote(s): _____

x	$y = 3(2^x)$
-3	
-2	
-1	
0	
1	
2	
3	

Domain: _____
 Range: _____
 Intercept(s): _____
 Asymptote(s): _____

x	$y = -3(2^x)$
-3	
-2	
-1	
0	
1	
2	
3	

Domain: _____
 Range: _____
 Intercept(s): _____
 Asymptote(s): _____



b) Compare these graphs to the graph of $y = 2^x$, describing the effect of the constant C when C is positive, negative, and between 0 and 1. Describe these effects as transformations using the terms vertical stretch/shrink and reflection (include appropriate axes).

c) What is the y-intercept of the general function $y = Cb^x$? _____

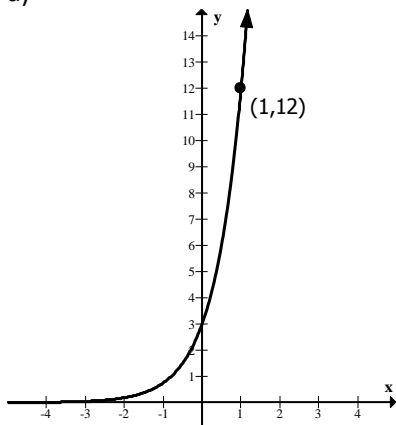
What is the domain of $y = Cb^x$? _____

What is the range of $y = Cb^x$ when $C < 0$? _____

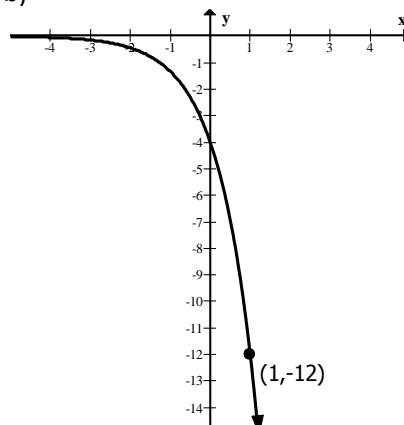
What is the range of $y = Cb^x$ when $C > 0$? _____

4. Each of the graphs below represents a function of the form $y = Cb^x$, with $b > 0$, $b \neq 1$. In each case, write a formula for the function.

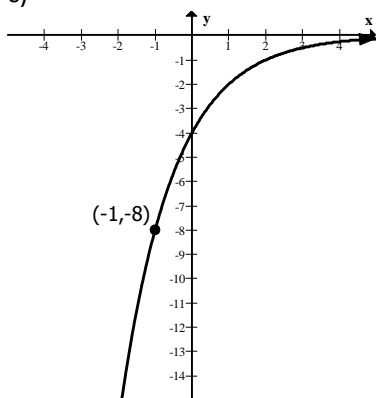
a)



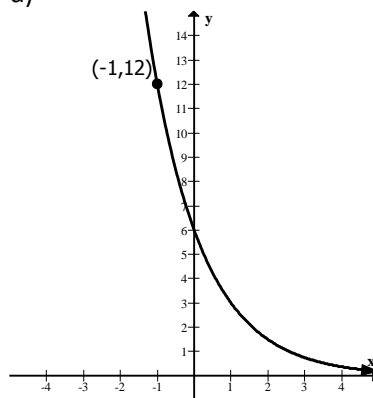
b)



c)



d)



5. The tables below give the function values for two functions $f(x)$ and $g(x)$. One of the functions is linear; the other is exponential. Determine which function is which, then write an equation for each.

a)

x	1	2	3	4
$f(x)$	8	12	16	20

b)

x	1	2	3	4
$g(x)$	8	12	18	27

6. Determine an equation of the form $y = Cb^x$, with $b > 0$, $b \neq 1$, so that the graph passes through the points (1, 12) and (3, 192).