

# Transformations of Exponential Graphs

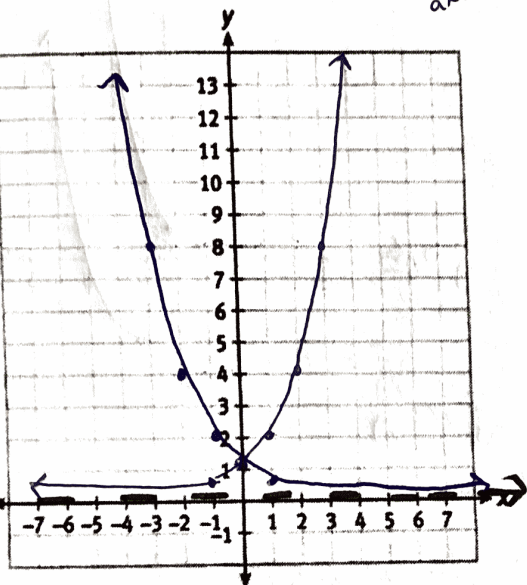
1.  $f(x) = 2^x$

$g(x) = 2^{-x}$

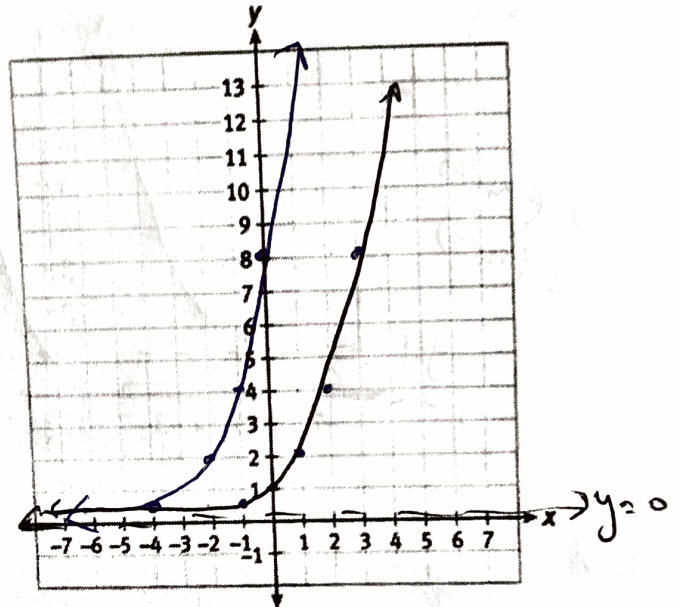
$h(x) = \left(\frac{1}{2}\right)^x$

Affects the x  
Reflect across y axis

$$\begin{array}{c|c} -1 & \frac{1}{2} \\ \hline 0 & 1 \\ \hline 1 & 2 \end{array}$$



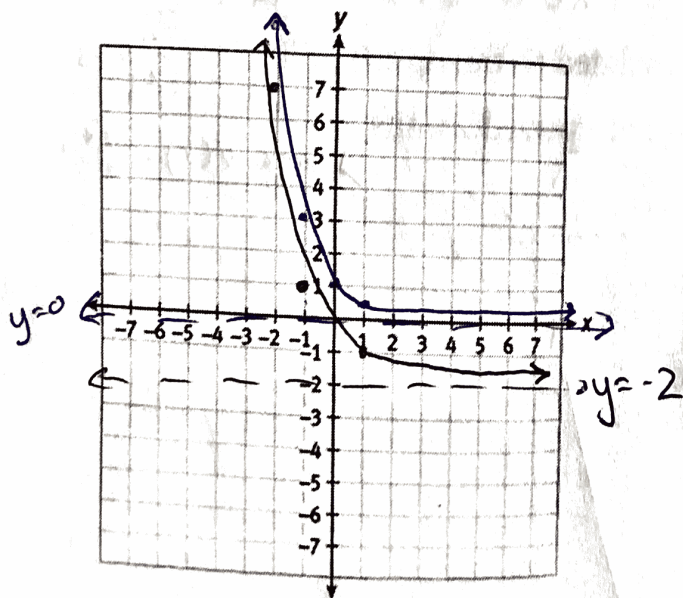
2.  $f(x) = 2^x$   
 $g(x) = 2^{x+3}$



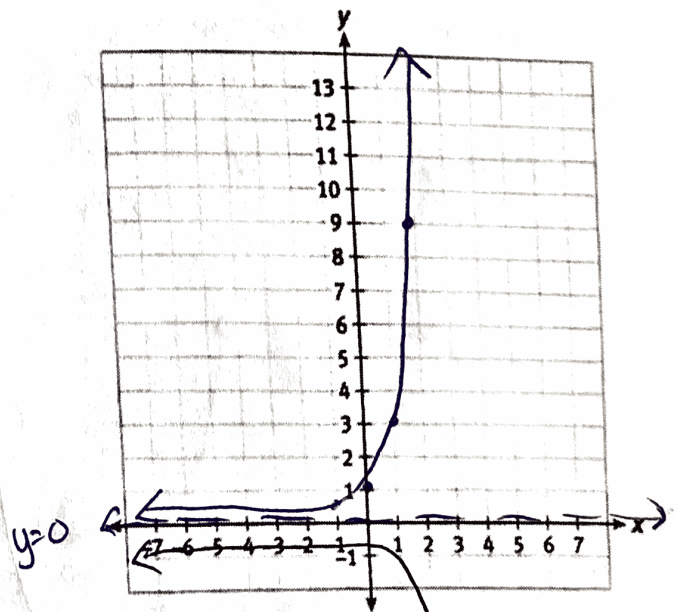
3.  $f(x) = \left(\frac{1}{3}\right)^x \rightarrow 3^{-x}$

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

$$\begin{array}{c|c} -1 & \\ \hline 0 & \\ \hline 1 & \end{array}$$



4.  $f(x) = 3^x$   
 $-f(x)$

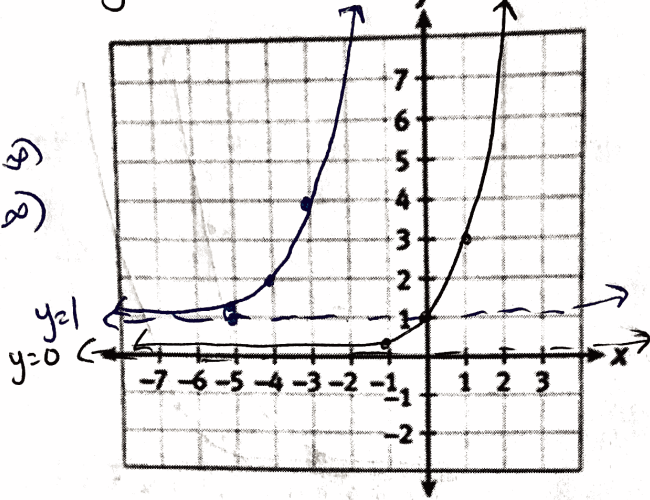


Describe how each function results from transforming a parent graph of the form  $f(x) = b^x$ . Then sketch the parent graph and the given function on the same axes. Give the domain and range of each function in interval notation. Give the equations of the asymptotes.

a.  $g(x) = 3^{x+4} + 1$    
 left 4   
 up 1

parent:  $g(x) = 3^x$    
 D:  $(-\infty, \infty)$    
 R:  $(0, \infty)$

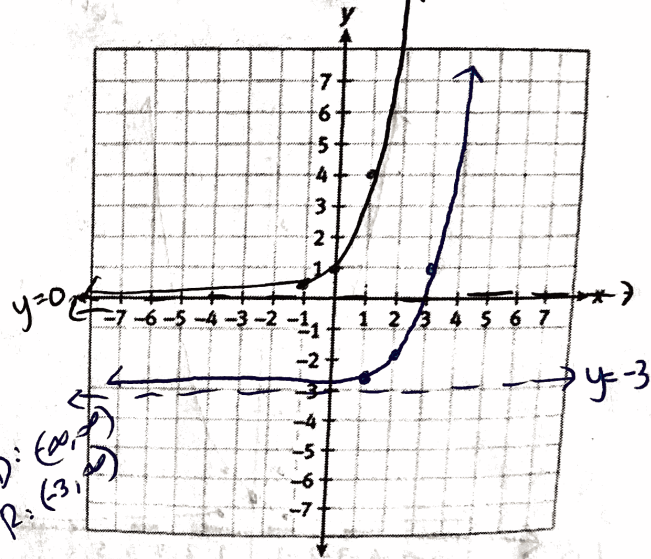
D:  $(-\infty, \infty)$    
 R:  $(1, \infty)$



b.

$g(x) = 4^{x-2} - 3$    
 D:  $(-\infty, \infty)$    
 R:  $(0, \infty)$

D:  $(-\infty, \infty)$    
 R:  $(-3, \infty)$



**Make use of structure.** Write the equation that indicates each transformation of the parent equation  $f(x) = 2^x$ . Then use the graph below and draw and label each transformation.

For  $g(x)$ , the  $y$ -intercept is at  $(0, 3)$ .  $g(x) = 3 \cdot 2^x$  or  $g(x) = 2^x + 2$

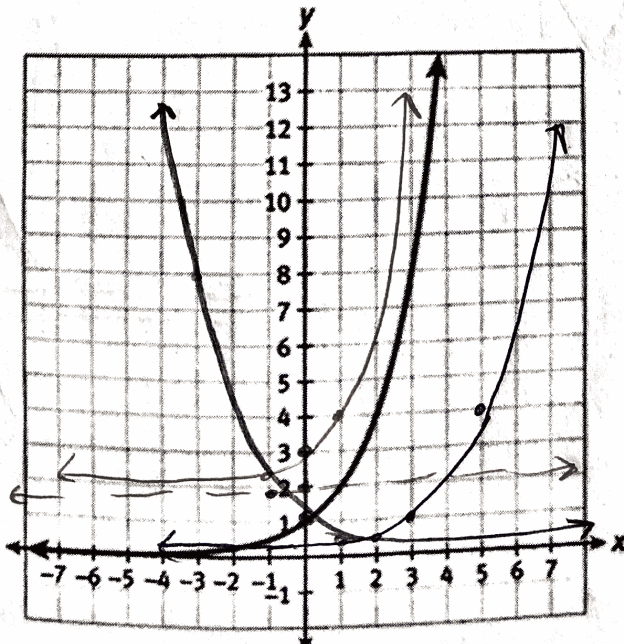
For  $h(x)$ , the exponential growth factor is 0.5.  $h(x) = (\frac{1}{2})^x$  or  $h(x) = 2^{-x}$

For  $k(x)$ , the graph of  $f(x)$  is horizontally translated to the right 3 units.

$k(x) = (2)^{x-3}$

For  $l(x)$ , the graph of  $f(x)$  is vertically translated upward 2 units.

$l(x) = 2^x + 2$



## Exponential Homework Day 3

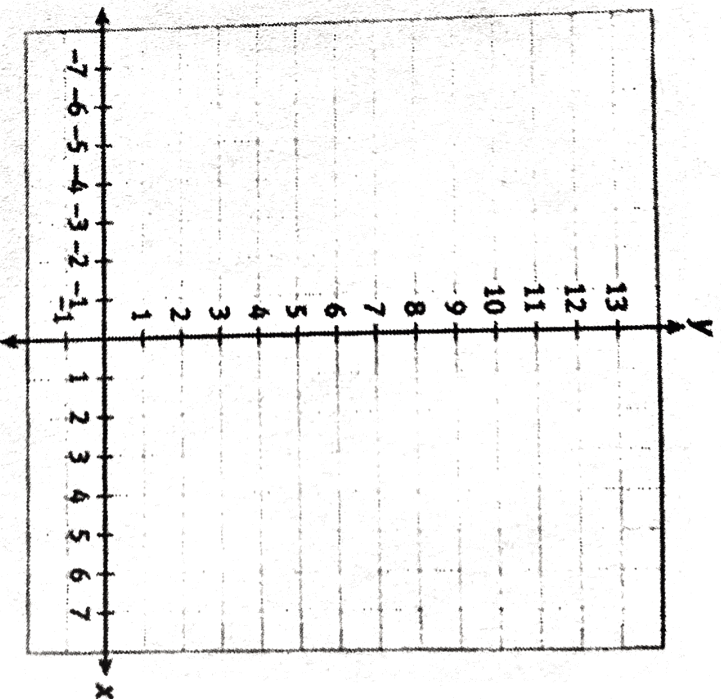
1. Graph the following, each in a different color.

a.  $f(x) = 3^x$

b.  $f(x) = -3^x$

c.  $f(x) = 3^{x-2}$

d.  $f(x) = 2 \cdot 3^x$



2. Write the equation of the exponential parent function  $f(x) = 5^x$  shifted left four and down 5.

3. a. Write the equation of the exponential parent function  $f(x) = 5^x$  reflected across the y axis.

b. Bonus: What is another way of writing this function?