

## PROBLEM 3 The Multiple Representations of Exponentials



1. Complete the table and sketch a graph for each exponential function of the form  $f(x) = ab^x$ . Then determine the  $x$ -intercept(s),  $y$ -intercept, asymptote, domain, range, and interval(s) of increase/decrease.

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

$x$	$f(x)$
-2	
-1	
0	
1	
2	
3	



$x$ -intercept(s):

$y$ -intercept:

asymptote:

domain:

range:

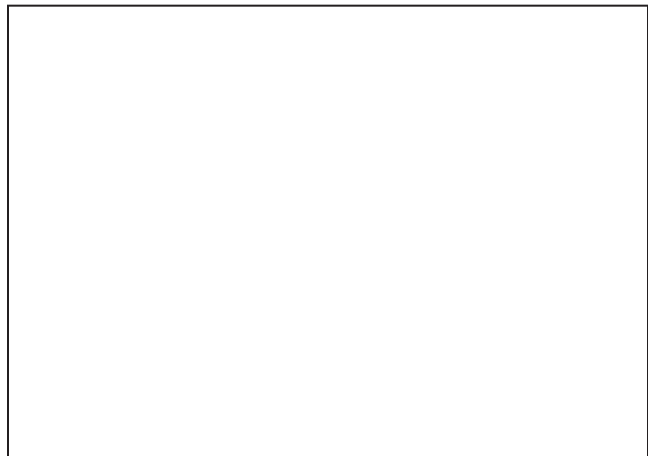
interval(s) of increase/decrease:

Analyze the form of each function and make a prediction about the shape of the graph before you start. What do the  $a$  and  $b$  values tell you?



b.  $g(x) = \left(\frac{1}{2}\right)^x$

$x$	$g(x)$
-2	
-1	
0	
1	
2	
3	



$x$ -intercept(s):

$y$ -intercept:

asymptote:

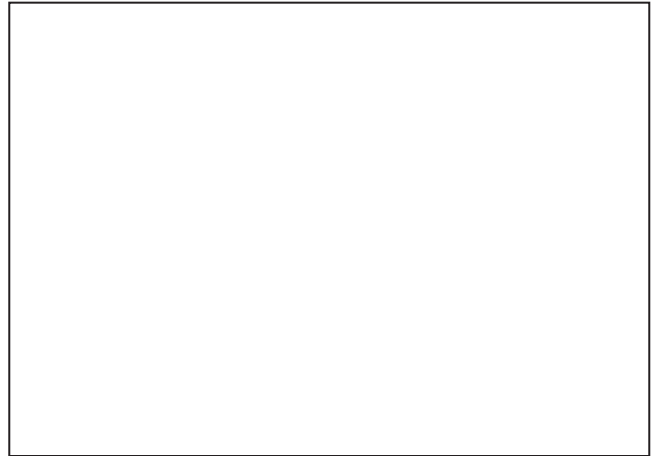
domain:

range:

interval(s) of increase/decrease:

c.  $k(x) = 5 \cdot 2^x$

$x$	$k(x)$
-2	
-1	
0	
1	
2	
3	



$x$ -intercept(s):

$y$ -intercept:

asymptote:

domain:

range:

interval(s) of increase/decrease:

d.  $p(x) = -4^x$

$x$	$p(x)$
-2	
-1	
0	
1	
2	
3	



$x$ -intercept(s):

$y$ -intercept:

asymptote:

domain:

range:

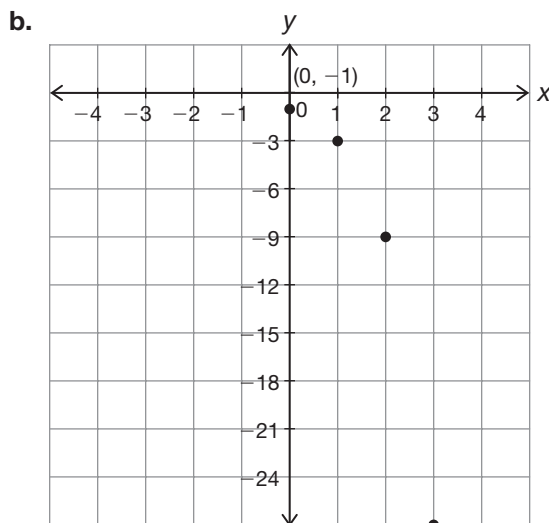
interval(s) of increase/decrease:

2. Write an exponential equation of the form  $y = ab^x$  for each. Explain your reasoning.

a.

$x$	$y$
0	1
1	4
2	16
3	64

If you know the  $y$ -intercept, then you know the  $a$ -value. You can use any of the other ordered pairs to determine the  $b$ -values.



3. Given a function of the form  $f(x) = ab^x$ .

a. What does the  $a$ -value tell you?

b. What does the  $b$ -value tell you?



Be prepared to share your solutions and methods.