Learning Activity – Section 9.3 – Logarithmic Functions

Names: _____ _____

_____ _____

1. Write each equation in exponential form.

a. $\log_4 64 = 3$ b. $\log 100 = 2$ c. $\ln\left(\frac{1}{e^{10}}\right) = -10$

2. Write each equation in logarithmic form.

a. $e^0 = 1$ b. $\left(\frac{1}{6}\right)^{-2} = 36$ c. $10^{-3} = \frac{1}{1,000}$

3. Evaluate each logarithmic expression by converting to exponential form, or by applying a basic property of logarithms.

a. $\log\left(\frac{1}{10,000}\right)$ b. $\log_{3/7} \frac{9}{49}$ c. $\log_{17} \sqrt{17}$

d. $\log_\pi 1$ e. $\log_{97} 97$ f. $\log_{1/4}\left(\frac{1}{4}\right)^{5x-1}$

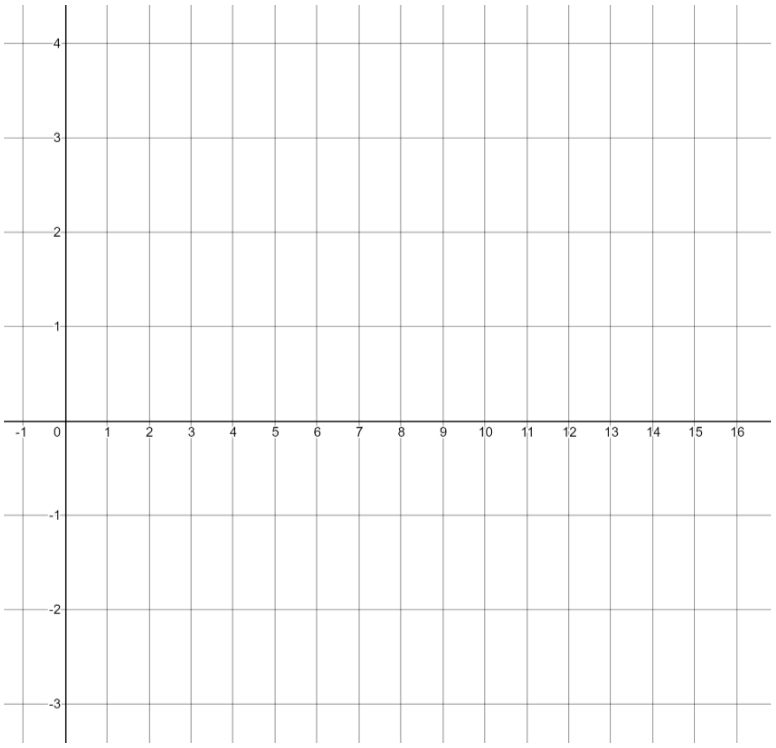
4. The inverse of $f(x)=2^x$ is $f^{-1}(x)=$_____ .

5. For any point (a,b) on the graph of the one-to-one function f, the ordered pair $(\_\_\_\_\ ,\ \_\_\_\_)$ is a point of the graph of its inverse f^{-1}.

6. Consider the function $g(x)=\log_2 x$.

a. Complete the table, and graph $g(x)=\log_2 x$ on the given coordinate system.

points on the graph of $f(x)=2^x$	points on the graph of $g(x)=\log_2 x$
$\left(-3,\frac{1}{8}\right)$	
$\left(-2,\frac{1}{4}\right)$	
$\left(-1,\frac{1}{2}\right)$	
$(0,1)$	
$(1,2)$	
$(2,4)$	
$(3,8)$	
$(4,16)$	



b. Write the equation of the vertical asymptote of $g(x)=\log_2 x$.

c. Write the domain of $g(x)=\log_2 x$ in interval notation.

d. Write the range of $g(x)=\log_2 x$ in interval notation.

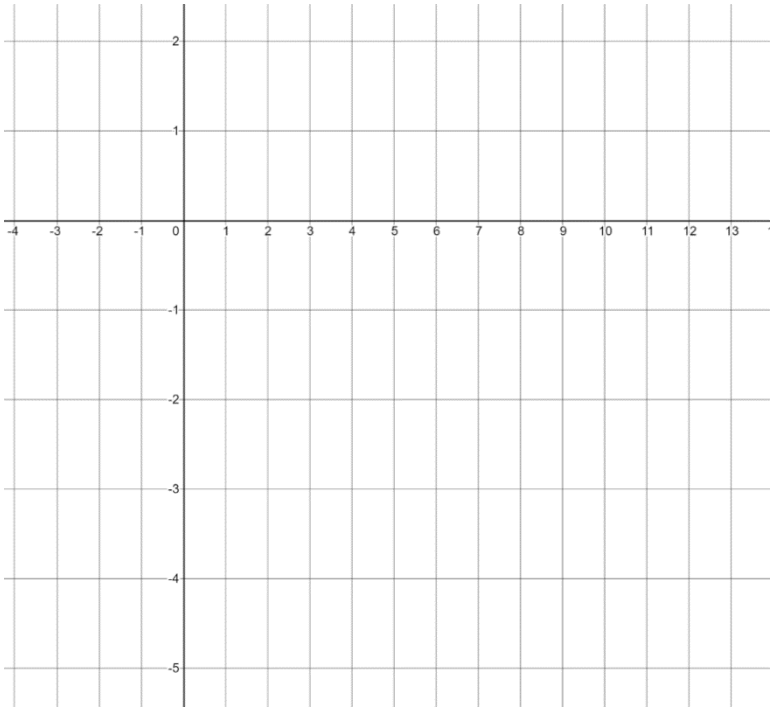
7. Consider the function $h(x)=\log_2(x+3)-2$.

a. The graph of $h(x)=\log_2(x+3)-2$ is the graph of $g(x)=\log_2 x$ shifted _____ units to the _____ (left/right), and _____ units _____ (upward/downward).

b. To find points on the graph of $h(x)=\log_2(x+3)-2$, we can take points on the graph of $g(x)=\log_2 x$ and _____ (add/subtract) _____ to/from each x-coordinate, and _____ (add/subtract) _____ to/from each y-coordinate.

c. Follow the plan indicated in part (b) to complete the table, and graph $h(x)=\log_2(x+3)-2$ on the given coordinate system.

points on the graph of $f(x)=2^x$	points on the graph of $g(x)=\log_2 x$	points on the graph of $h(x)=\log_2(x+3)-2$
$\left(-3,\frac{1}{8}\right)$		
$\left(-2,\frac{1}{4}\right)$		
$\left(-1,\frac{1}{2}\right)$		
$(0,1)$		
$(1,2)$		
$(2,4)$		
$(3,8)$		
$(4,16)$		



d. Write the equation of the vertical asymptote of $h(x)=\log_2(x+3)-2$:

e. Write the domain of $h(x)=\log_2(x+3)-2$ in interval notation:

f. Write the range of $h(x)=\log_2(x+3)-2$ in interval notation:

8. To find the domain of any logarithmic function of the form $y = \log_b(\text{argument})$, solve

   _____ > 0 and then write the solution in interval notation.

9. Write the domain of each function in interval notation.

a. $m(x) = \log_5\left(9 - \frac{3}{2}x\right)$

b. $n(x) = \ln\left(x^2 + 7x - 30\right)$

   (Hint: See section 7.5 notes to further review how to solve a quadratic inequality.)