

Learning Activity – Section 9.2 – Exponential Functions

Names: _____

1. Without graphing, determine whether each function is increasing or decreasing. Explain how you know.

a. $a(x) = \left(\frac{9}{8}\right)^x$

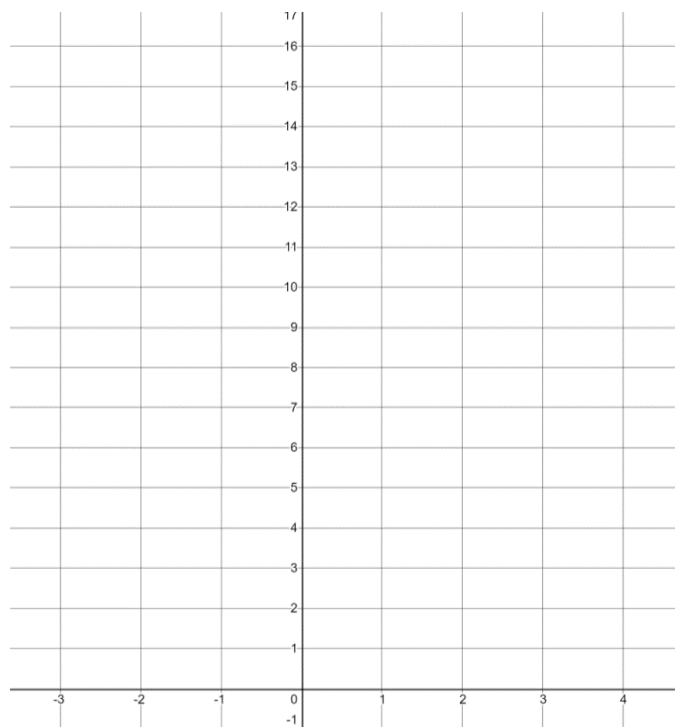
b. $b(x) = 0.98^x$

c. $c(x) = e^x$

2. Consider the function $f(x) = 2^x$.

- a. Complete the table, and graph $f(x) = 2^x$ on the given coordinate system.

x	$f(x) = 2^x$
-3	
-2	
-1	
0	
1	
2	
3	
4	



- b. Write the domain of $f(x) = 2^x$ in interval notation.
- c. Write the equation of the horizontal asymptote of $f(x) = 2^x$.
- d. Write the range of $f(x) = 2^x$ in interval notation.

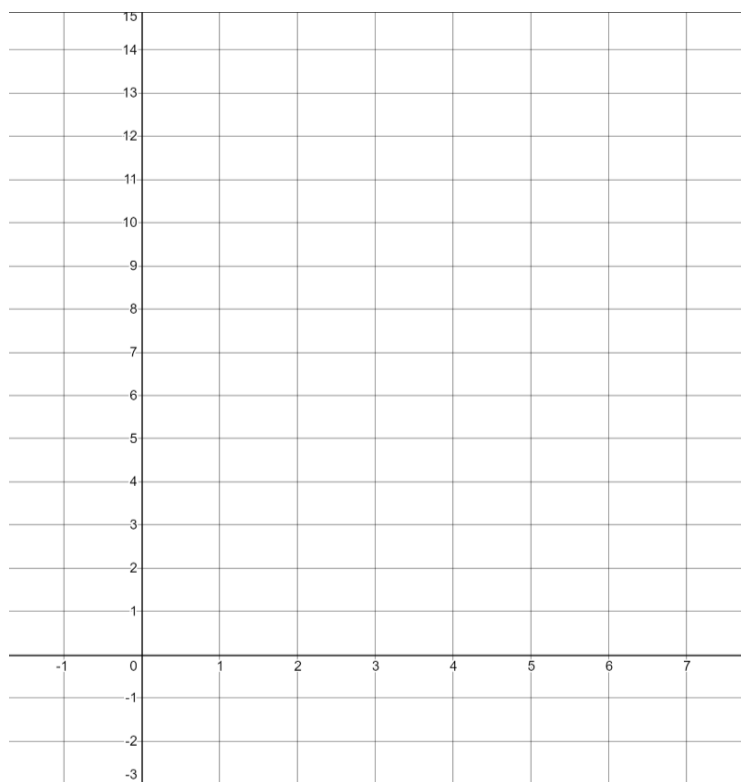
3. Consider the function $g(x) = 2^{x-3} - 2$.

a. The graph of $g(x) = 2^{x-3} - 2$ is the graph of $f(x) = 2^x$ shifted _____ units to the _____, and _____ units _____.

b. To find points on the graph of $g(x) = 2^{x-3} - 2$, we can take points on the graph of $f(x) = 2^x$ and _____ to/from each x -coordinate, and _____ to/from each y -coordinate.

c. Follow the plan indicated in part (b) to complete the table, and graph $g(x) = 2^{x-3} - 2$ on the given coordinate system.

Points of $f(x) = 2^x$	Points of $g(x) = 2^{x-3} - 2$
$(-3, \underline{\quad})$	
$(-2, \underline{\quad})$	
$(-1, \underline{\quad})$	
$(0, \underline{\quad})$	
$(1, \underline{\quad})$	
$(2, \underline{\quad})$	
$(3, \underline{\quad})$	
$(4, \underline{\quad})$	



d. Write the domain of $g(x) = 2^{x-3} - 2$ in interval notation.

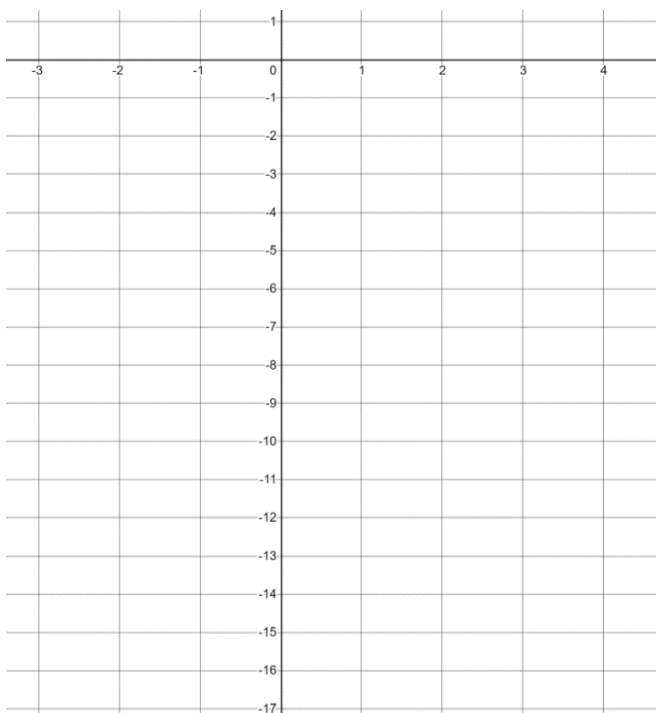
e. Write the equation of the horizontal asymptote of $g(x) = 2^{x-3} - 2$.

f. Write the range of $g(x) = 2^{x-3} - 2$ in interval notation.

4. Consider the function $h(x) = -2^x$.

- The graph of $h(x) = -2^x$ is the graph of $f(x) = 2^x$, reflected over the _____ - axis.
- To find points on the graph of $h(x) = -2^x$, we can take points on the graph of $f(x) = 2^x$ and change the sign of each _____ - coordinate.
- Follow the plan indicated in part (b) to complete the table, and graph $h(x) = -2^x$ on the given coordinate system.

Points of $f(x) = 2^x$	Points of $h(x) = -2^x$
$(-3, \underline{\quad})$	
$(-2, \underline{\quad})$	
$(-1, \underline{\quad})$	
$(0, \underline{\quad})$	
$(1, \underline{\quad})$	
$(2, \underline{\quad})$	
$(3, \underline{\quad})$	
$(4, \underline{\quad})$	



- Write the domain of $h(x) = -2^x$ in interval notation.
- Write the equation of the horizontal asymptote of $h(x) = -2^x$.
- Write the range of $h(x) = -2^x$ in interval notation.

5. Suppose \$20,000 is invested for 7 years. Find the accumulated amount under the following plans, rounded to the nearest cent. Circle the plan that yields the greatest return.
- 4.2% simple interest (Hint: Which formula should you use? Does this formula give you the accumulated amount, or just the interest earned?)
 - 3.6% interest compounded monthly (Hint: Which formula should you use? What value of n should you use?)
 - 3.8% interest compounded continuously (Hint: Which formula should you use? What value of n should you use?)

6. The population of Florida panthers in 1980 was about 24 panthers, and in the year 2010 about 117 panthers. At this rate, the population of Florida panthers can be modelled by the function $p(t) = 24(1.0542)^t$ where t is the number of years since 1980.
- a. Fill in the blanks.
- The input variable of the function is _____, and it represents the number of _____ since _____.
 - The output is given symbolically by _____ which represents the _____ of _____.
- b. Use the function to approximate the projected population of Florida panthers for the year 2032. Label your numerical answer with the appropriate unit. (Hints: How do we determine the value of t for which we should evaluate the function? If we're counting the number of animals, what place value should we round to?)