

University of South Carolina  
Math 111: College Algebra  
Instructor: Austin Mohr  
Section 8  
Fall 2008

---

Exponential Functions

Recall that an exponential function is a function that can be written as  $f(x) = Ca^x$ .

If  $a > 1$ ,  $f(x)$  is an exponential growth function and  $a$  is called the growth factor.

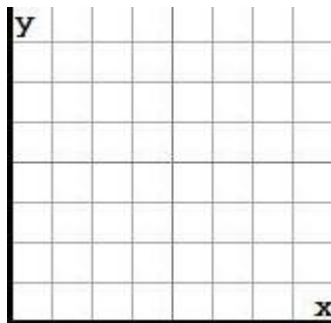
If  $0 < a < 1$ ,  $f(x)$  is an exponential decay function and  $a$  is called the decay factor.

In both exponential growth and decay, we call  $C$  the initial value and require that  $C > 0$ .

1. Why do we require  $a > 1$  in order to model growth? Why do we require  $0 < a < 1$  in order to model decay? What happens if  $a = 0$ ? What happens if  $a = 1$ ?

2. Carefully graph the following exponential growth functions on the same set of axes. Label each function on your graph.

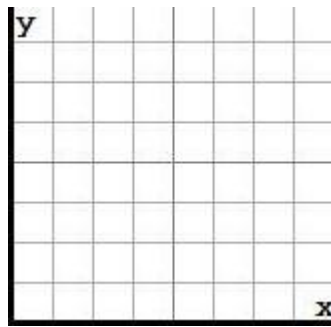
- a.  $f(x) = 2^x$
- b.  $g(x) = \left(\frac{3}{2}\right)^x$
- c.  $h(x) = 3^x$



2. How does the growth factor affect the graph of the function?

3. Carefully graph the following exponential decay functions on the same set of axes. Label each function on your graph.

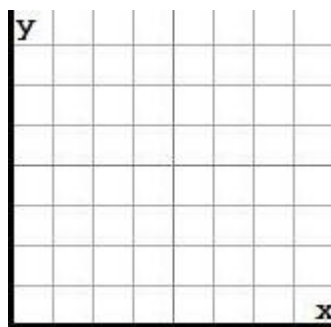
- a.  $f(x) = 8\left(\frac{1}{2}\right)^x$
- b.  $g(x) = 8\left(\frac{1}{4}\right)^x$
- c.  $h(x) = 8\left(\frac{1}{8}\right)^x$



4. How does the decay factor affect the graph of the function?

5. Carefully graph the following exponential growth functions on the same set of axes. Label each function on your graph.

- a.  $f(x) = 2^x$
- b.  $g(x) = 2 * 2^x$
- c.  $h(x) = 3 * 2^x$



6. How does the initial value affect the graph of the function?