

**Goals:**

- I can graph exponential growth functions.
- I can graph exponential decay functions.

**HW:** Complete the worksheet

Name: \_\_\_\_\_

Algebra II  
Graphing Exponential Functions

**Exponential Growth**

**Parent Functions:**  $f(x) = b^x, b > 1$

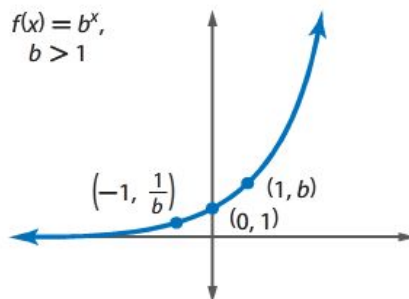
**Type of graph:** continuous, one-to-one, and increasing

**Domain:** all real numbers

**Range:** all positive real numbers

**Asymptote:** x-axis

**Intercept:** (0, 1)



**Example 1: Graph Exponential Growth Functions**

Graph  $y = 3^x$ . State the domain and range.

x	y
-2	
-1	
0	
1	
2	

Domain: { \_\_\_\_\_ }

Range: { \_\_\_\_\_ }

**Parent Function:**  $f(x) = ab^{x-h} + k$

a:

h:

k:

**Example 2:** Graph each function. State the domain and range.

$y = 2^x + 1$

x	$y = 2^x + 1$
-2	
-1	
0	
1	
2	

Domain: { \_\_\_\_\_ }

Range: { \_\_\_\_\_ }

Name:

Algebra II  
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Example 3: Graph each function. State the domain and range.

$$y = -2 \cdot 5^{x-2}$$

$a$ :

$h$ :

$k$ :

Domain: {                    }

Range: {                    }

Notes: Exponential growth with a constant percent increase over specific time periods using the following function

$$A(t) = a(1+r)^t$$

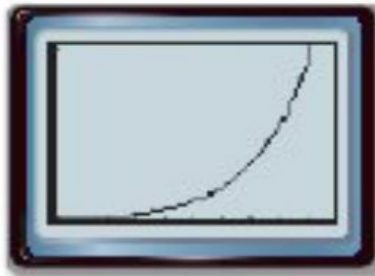
Example 4:

**CENSUS** The first U.S. census was conducted in 1790. At that time, the population was 3,929,214. Since then, the U.S. population has grown by approximately 2.03% annually. Draw a graph showing the population growth of the U.S. since 1790.

First, write an equation using  $a = 3,929,214$ , and  $r = 0.0203$ .

$$y = 3,929,214(1.0203)^t$$

Then graph the equation.



[0, 250] scl: 25 by [0, 400,000,000]  
scl: 40,000,000

**KeyConcept** Parent Function of Exponential Decay Functions

Parent Functions:	$f(x) = b^x, 0 < b < 1$	Model
Type of graph:	continuous, one-to-one, and decreasing	<p><math>f(x) = b^x, 0 &lt; b &lt; 1</math></p> <p>Points: <math>(-1, \frac{1}{b})</math>, <math>(0, 1)</math>, <math>(1, b)</math></p>
Domain:	all real numbers	
Range:	positive real numbers	
Asymptote:	$x$ -axis	
Intercept:	$(0, 1)$	