

# GUIDED NOTES – 6.2 GRAPHS OF EXPONENTIAL FUNCTIONS

## LEARNING OBJECTIVES

In this section, you will:

- Graph exponential functions.
- Graph exponential functions using transformations.

## GRAPHING EXPONENTIAL FUNCTIONS

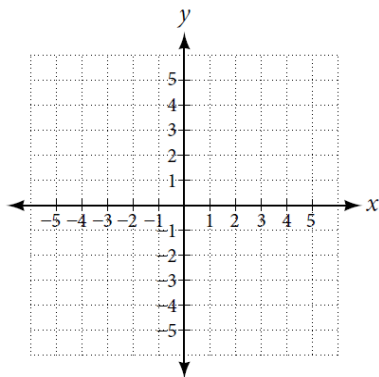
Study the box in your textbook section titled “characteristics of the graph of the parent function  $f(x) = b^x$ .”

- An exponential function with the form  $f(x) = b^x, b > 0, b \neq 1$ , has these characteristics:

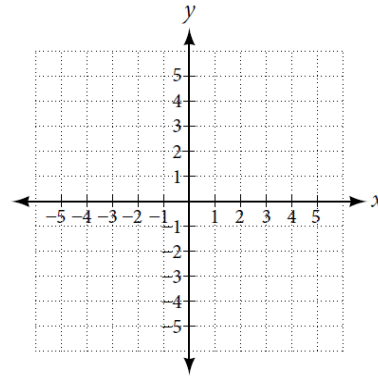
- \_\_\_\_\_ function
- Horizontal asymptote: \_\_\_\_\_
- Domain: \_\_\_\_\_
- Range: \_\_\_\_\_
- $x$ -intercept: \_\_\_\_\_
- $y$ -intercept: \_\_\_\_\_
- Increasing if  $b$  \_\_\_\_\_ 1
- Decreasing if  $b$  \_\_\_\_\_ 1

- Sketch the exponential function in the form  $f(x) = b^x$ , when

$$b > 1$$



$$0 < b < 1$$

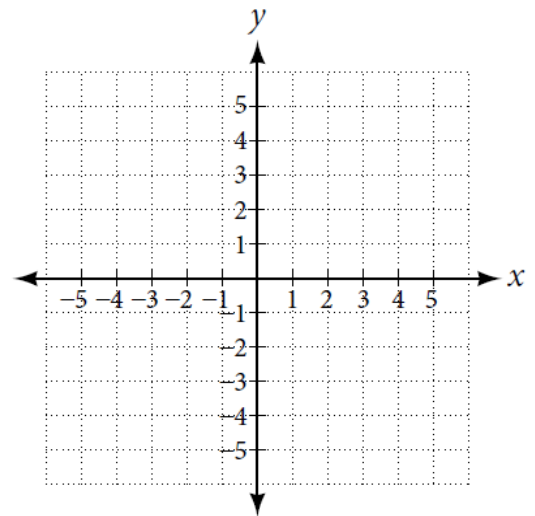


- Write out the 4 step process for graphing the function, given an exponential function in the form  $f(x) = b^x$ .

- 1.
- 2.
- 3.
- 4.

**Try It:** Read Example 1 in the text, then answer the following.

Sketch the graph  $f(x) = 4^x$ . State the domain, range, and asymptote.



**Homework:** You should now be ready to attempt problems 1-3 in “Homework – Section 6.2” on WeBWorK.

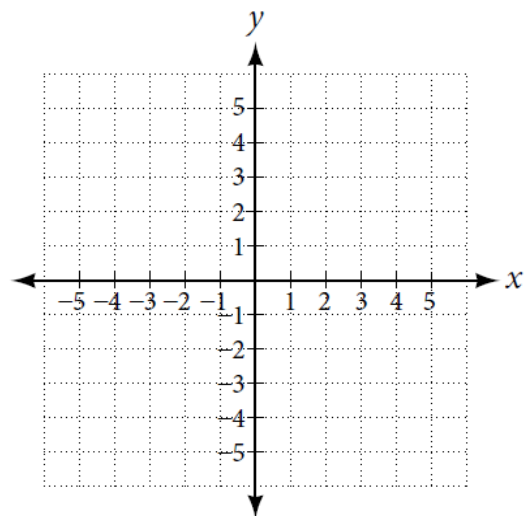
### GRAPHING TRANSFORMATIONS OF EXPONENTIAL FUNCTIONS

Study the box in your textbook section titled “shifts of the parent function  $f(x) = b^x$ ”.

- For any constants  $c$  and  $d$ , the function  $f(x) = b^{x+c} + d$  shifts the parent function  $f(x) = b^x$ 
  - Vertically \_\_\_\_\_ units, in the \_\_\_\_\_ direction of the sign of \_\_\_\_\_
  - Horizontally \_\_\_\_\_ units, in the \_\_\_\_\_ direction of the sign of \_\_\_\_\_
  - The y-intercept becomes  $(0, \underline{\hspace{2cm}})$
  - The horizontal asymptote becomes  $y = \underline{\hspace{2cm}}$
  - The range becomes \_\_\_\_\_
  - The domain remains \_\_\_\_\_
- Write out the 4 step process for graphing the translation, given an exponential function in the form  $f(x) = b^{x+c} + d$ .
  - 1.
  - 2.
  - 3.
  - 4.

**Try It:** Read Example 2 in the text, then answer the following.

Graph  $f(x) = 2^{x-1} + 3$ . State the domain, range, and asymptote.



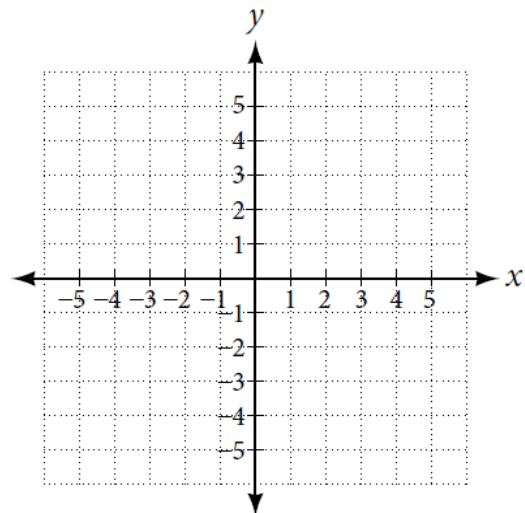
**Homework:** You should now be ready to attempt problems 4-6 in “Homework – Section 6.2” on WeBWorK.

Study the box in your textbook section titled “stretches and compressions of the parent function  $f(x) = b^x$ ”.

- For any factor  $a > 0$ , the function  $f(x) = a(b)^x$ 
  - Is \_\_\_\_\_ vertically by a factor of  $a$  if  $|a| > 1$
  - Is \_\_\_\_\_ vertically by a factor of  $a$  if  $|a| < 1$
  - The y-intercept becomes  $(0, \text{_____})$
  - The horizontal asymptote is  $y = \text{_____}$
  - The range is \_\_\_\_\_
  - The domain is \_\_\_\_\_

**Try It:** Read Example 4 in the text, then answer the following.

Sketch the graph  $f(x) = \frac{1}{2}(4)^x$ . State the domain, range, and asymptote.

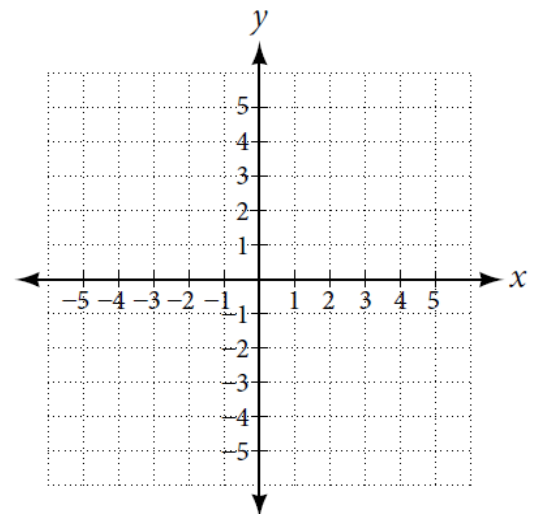


Study the box in your textbook section titled “reflections of the parent function  $f(x) = b^x$ .”

- The function  $f(x) = -b^x$ 
  - Reflects the parent function  $f(x) = b^x$  about the \_\_\_-axis
  - The  $y$ -intercept becomes  $(0, \underline{\hspace{2cm}})$
  - The horizontal asymptote is  $y = \underline{\hspace{2cm}}$
  - The range is  $\underline{\hspace{2cm}}$
  - The domain is  $\underline{\hspace{2cm}}$
- The function  $f(x) = b^{-x}$ 
  - Reflects the parent function  $f(x) = b^x$  about the \_\_\_-axis
  - The  $y$ -intercept becomes  $(0, \underline{\hspace{2cm}})$
  - The horizontal asymptote is  $y = \underline{\hspace{2cm}}$
  - The range is  $\underline{\hspace{2cm}}$
  - The domain is  $\underline{\hspace{2cm}}$

**Try It:** Read Example 5 in the text, then answer the following.

Find and graph the equation for a function,  $g(x)$ , that reflects  $f(x) = 1.25^x$  about the  $y$ -axis. State its domain, range, and asymptote.



Study your textbook section to fill in the following table.

Translations of the Parent Function $f(x) = b^x$	
Translation	Form
Shift  _____	$f(x) =$ _____
Stretch and Compress  _____	$f(x) =$ _____
Reflect about the $x$ -axis	$f(x) =$ _____
Reflect about the $y$ -axis	$f(x) =$ _____
General equation for all translations	$f(x) =$ _____

Study the box in your textbook section titled “translations of exponential functions.”

- A translation of an exponential functions has the form

$$f(x) = \text{_____}, \text{ where the parent function } f(x) = b^x, b > 1 \text{ is}$$

- Shifted horizontally \_\_\_\_\_ units to the \_\_\_\_\_
- \_\_\_\_\_ vertically by a factor of  $|a|$  if  $|a| > 1$
- \_\_\_\_\_ vertically by a factor of  $|a|$  if  $0 < |a| < 1$
- Shifted vertically \_\_\_\_\_ units
- Reflected about the  $x$ -axis when  $a$  \_\_\_\_\_ 0

\* Note the order of the shifts, transformations, and reflections follow the order of operations.

**Homework:** You should now be ready to attempt problem 8 in “Homework – Section 6.2” on WeBWork.