

# Chapter 3 Exponential and Logarithmic Functions

Course Number

Instructor

Date

## Section 3.1 Exponential Functions and Their Graphs

**Objective:** In this lesson you learned how to recognize, evaluate, and graph exponential functions.

**Important Vocabulary** Define each term or concept.

**Transcendental functions** Functions that are not algebraic.

**Natural base  $e$**  The irrational number  $e \approx 2.718281828 \dots$

### I. Exponential Functions (Page 184)

Polynomial functions and rational functions are examples of \_\_\_\_\_ algebraic \_\_\_\_\_ functions.

The exponential function  $f$  with base  $a$  is denoted by \_\_\_\_\_  $f(x) = a^x$  \_\_\_\_\_, where  $a > 0$ ,  $a \neq 1$ , and  $x$  is any real number.

**Example 1:** Use a calculator to evaluate the expression  $5^{3/5}$ .  
2.626527804

*What you should learn*  
How to recognize and evaluate exponential functions with base  $a$

### II. Graphs of Exponential Functions (Pages 185–187)

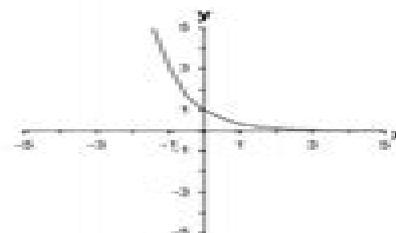
For  $a > 1$ , is the graph of  $f(x) = a^x$  increasing or decreasing over its domain? \_\_\_\_\_ Increasing \_\_\_\_\_

For  $a > 1$ , is the graph of  $g(x) = a^{-x}$  increasing or decreasing over its domain? \_\_\_\_\_ Decreasing \_\_\_\_\_

For the graph of  $y = a^x$  or  $y = a^{-x}$ ,  $a > 1$ , the domain is \_\_\_\_\_  $(-\infty, \infty)$  \_\_\_\_\_, the range is \_\_\_\_\_  $(0, \infty)$  \_\_\_\_\_, and the intercept is \_\_\_\_\_  $(0, 1)$  \_\_\_\_\_. Also, both graphs have \_\_\_\_\_ the  $x$ -axis \_\_\_\_\_ as a horizontal asymptote.

**Example 2:** Sketch the graph of the function  $f(x) = 3^{-x}$ .

*What you should learn*  
How to graph exponential functions with base  $a$



# Chapter 3 Exponential And Logarithmic Functions

**Ensheng Dong**



### Chapter 3 Exponential And Logarithmic Functions:

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