Chapter 5  Exponential and Logarithmic Functions

Section 5.1  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.

Algebraic functions
Transcendental functions
Natural base $e$
Continuous compounding

I. Exponential Functions  (Page 390)

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

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

II. Graphs of Exponential Functions  (Pages 391–393)

For $a > 1$, is the graph of $y = a^x$ increasing or decreasing over its domain? ________________

For $a > 1$, is the graph of $y = a^{-x}$ increasing or decreasing over its domain? ________________

For the graph of $y = a^x$ or $y = a^{-x}$, $a > 1$, the domain is ________________, the range is ________________, and the intercept is ________________. Also, both graphs have ________________ as a horizontal asymptote.
Example 2: Sketch the graph of the function \( f(x) = 3^{-x} \).

![Graph of \( f(x) = 3^{-x} \)]

III. The Natural Base \( e \) (Page 394)

The natural exponential function is given by the function \( e^x \).

Example 3: Use a calculator to evaluate the expression \( e^{3/5} \).

IV. Applications of Exponential Functions (Pages 395–397)

After \( t \) years, the balance \( A \) in an account with principal \( P \) and annual interest rate \( r \) (in decimal form) is given by the formulas:

For \( n \) compoundings per year: _______________

For continuous compounding: _______________

Example 4: Find the amount in an account after 10 years if $6000 is invested at an interest rate of 7%,
(a) compounded monthly.
(b) compounded continuously.

Homework Assignment

Page(s)

Exercises