

4.1: Prelude to Exponential and Logarithmic Functions including Exponential properties

In this chapter we examine exponential and logarithmic functions. We will need these functions in the next chapter, when examining financial calculations.

This chapter is a new addition to this textbook. The California Community Colleges Curriculum Course Descriptor for Finite Mathematics (C-ID; <https://c-id.net/descriptors.html>, <http://www.ccccurriculum.net/articulation/>) now requires coverage of exponential and logarithmic functions in a Finite Mathematics course that is part of an Associate Degree for Transfer.

Students enrolling in Finite Mathematics typically are required to complete an Intermediate Algebra course or equivalent, as a prerequisite, so students have already been exposed to much of the material in this chapter. However many students require a review of this material, which is the basis for financial calculations based on compound interest in the following chapter. In addition, review of this material is particularly important at colleges where Finite Mathematics serves as a prerequisite for Business Calculus.

This book assumes students have mastered working with exponents, and properties of exponents; it focuses on review of exponential and logarithmic functions with an eye toward skills needed to use exponential growth and decay models for financial calculations and other business applications, as well as subsequent use in a course on Business Calculus. For the most part, financial applications are not stressed in this new chapter, as financial calculations are the focus of the following chapter.

Definition: Properties of Exponential Functions

Adding Exponents

$$a^n * a^m = a^{n+m}$$

$$\text{Example: } a^2 * a^4 = a^{2+4} = a^6$$

Subtracting Exponents

$$a^n/a^m = a^{n-m} \text{ provided } a \text{ not equal to } 0$$

$$a^6/a^2 = a^{6-2} = a^4$$

Multiplying Exponents

$$(a^n)^m = a^{n*m}$$

Zero Exponent

$$a^0 = 1$$

Negative Exponents

$$a^{-n} = 1/a^n$$

1 in Exponent

$$a = a^1$$

Distributing Exponents

$$(ab)^n = (a^1b^1)^n = a^{1*n}b^{1*n} = a^n b^n$$

$$(a/b)^n = (a^1/b^1)^n = a^{1*n}/b^{1*n} = a^n/b^n$$

? Exercise 4.1.1

$$w^3w^5 = ?$$

Answer

$$w^{3+5} = w^8$$

? Exercise 4.1.1

$$y^6/y^2 = ?$$

Answer

$$y^{6-2} = y^4$$

? Exercise 4.1.1

$$(z^3)^5 = ?$$

Answer

$$z^{3*5} = z^{15}$$

? Exercise 4.1.1

$$2345^0 = ?$$

Answer

Any number raised to the 0 power is 1.

? Exercise 4.1.1

$$t^{-6} = ?$$

Answer

$$t^{-6} = 1/t^6$$

? Exercise 4.1.1

$$4^1 = ?$$

Answer

$$4$$

? Exercise 4.1.1

$$(a^3b^2)^4 = ?$$

Answer

$$a^{3*4}b^{2*4} = a^{12}b^8$$

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