Simplifying Exponents *With Common Bases*

Samuel Bove

October 30, 2024

Contents

1 Introduction

The goal of this document is to serve as a personal reference to understand how exponents *(with common bases),* can be simplified. This document also serves as my first ever *LaTeX* creation. I am very excited to continue using this tool to aid in my mathematical endeavors.

2 The Basic Simplification Techniques

The product rule:

If y and z are integers and x is a real number, then:

$$x^y \cdot x^z = x^{y+z}$$

The quotient rule:

If x is a nonzero real number and y and z are integers, then:

$$\frac{x^y}{x^z} = x^{y-z}$$

Negative Exponents:

If x is a real number other than 0 and y is a positive integer, then:

$$a^{-n} = \frac{1}{a^n}$$

$$\frac{1}{a^{-n}} = \frac{a^n}{1} \text{ or } a^n$$

Zero Exponent:

$$a^0 = 1$$

3 The three power rules

If x and y are real numbers and a and b are integers, then:

Power Rule:

$$(x^a)^b = x^{ab}$$

Power of a Product:

$$(xy)^a = x^a \cdot y^a$$

Power of a Quotient:

$$\left(\frac{x}{y}\right)^a = \frac{x^a}{y^a}$$

4 Tips/Reminders

- Even if the bases are the same, they cannot be combined if the exponents are not also the exact same.