Zero-over-Zero Theorem

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For some constant k, if $0/0 = k$, then $k = 1$.

Abstract

In this paper, we provide definitions and proof of the *Zero-over-Zero Theorem*. This theorem would be some help for the $0/0$ problem.

Contents

Introduction

$0/0$ is division where the dividend and divisor is zero. Since any number multiplied by zero is zero, the expression $0/0$ is undefined.[1] However, in this paper, we provide the theorem that explains what will be the value of $0/0$ if $0/0$ exists.

Proof

Theorem 1. *For some constant k, if $0/0 = k$, then $k = 1$.*

Proof. Let
$$k = \frac{0}{0},$$
then
$$k^n = \frac{0^n}{0^n} = \frac{0}{0} = k \ (n \in \mathbb{N}),$$
$$k^{-n} = \frac{0^{-n}}{0^{-n}} = \frac{0^n}{0^n} = \frac{0}{0} = k \ (n \in \mathbb{N})$$

Thus,
$$k^i = k \ (i \in \mathbb{Z}, \ i \neq 0)$$
$$\therefore k = 1$$

This completes the proof of the theorem. $\square$

Reference

[1] "Division by zero". wikipedia.org. Last edited on 2 February 2022.