Language: English

# Derivative Rules Compilation

The theorems below are considered the first step towards understanding calculus. It is around this time that the student is expected to learn the derivatives and use them in the upcoming years. This document will only list the theorems without their proofs since the proofs would make the document lengthy and would be better if placed in another document.

About the inverse trigonometric functions, $arc$ is preferred over writing an exponent of -1.

The numbering of the theorems is based on the order they appear during the lesson. It is not possible to look up "Derivative Theorem 3" in Google and find the exact same theorem labeled as "Theorem 3" below. Take note, however, that the theorems labeled as numbers 34 and 35 are miscellaneous and are placed at the end because they would not fit with the usual numbering.

The variable of differentiation is the second letter of the denominator. Unless otherwise specified, it is $x$ as seen in $\frac{d}{dx}$.

## Limit Definition of Derivative

$$f'(x) = \lim_{\Delta x \to 0} \frac{f(x + \Delta x) - f(x)}{\Delta x}$$

The prime ($'$) notation will be used to denote the derivative of a differentiable function.



## Theorem 1: Constant Rule

For any constant $c$:

$$\frac{d}{dx} c = 0$$

## Theorem 2: Power Rule of Derivatives

For $n \in \mathbb{R}$:

$$\frac{d}{dx} x^n = nx^{n-1}$$

## Theorem 3: Constant Multiple

Given a constant $c$ and a function $f$ in terms of $x$:

$$\frac{d}{dx} cf(x) = cf'(x)$$