

# Calculus Notes

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## 1 Introduction

Hello, this is a sample document for the calculus notes. This document is created using L<sup>A</sup>T<sub>E</sub>X.

Differentiation from first principles:

$$\begin{aligned}
 f'(x) &= \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} \\
 \frac{d}{dx} \sin(x) &= \cos(x) \\
 \frac{d}{dx} \cos(x) &= -\sin(x) \\
 -\frac{d}{dx} \sin(x) &= -\cos(x) \\
 -\frac{d}{dx} \cos(x) &= \sin(x) \\
 \frac{d}{dx} e^x &= e^x \\
 \frac{d}{dx} \ln x &= \frac{1}{x} \\
 \frac{d}{dx} \tan(kx) &= k \sec^2(kx) \\
 \frac{d}{dx} \sec(kx) &= k \sec(kx) \tan(kx) \\
 \frac{d}{dx} \cot(kx) &= -k \csc^2(kx) \\
 \frac{d}{dx} \csc(kx) &= -k \csc(kx) \cot(kx) \\
 \frac{d}{dx} f(g(x)) &= \frac{d}{dx} g(x) \cdot \frac{d}{dx} f(x) \\
 \frac{d}{dx} f(u) \cdot f(v) &= u \frac{dv}{dx} + v \frac{du}{dx} \\
 \frac{d}{dx} \frac{f(u)}{f(v)} &= \frac{v \frac{du}{dx} - u \frac{dv}{dx}}{v^2}
 \end{aligned}$$

JK just examples.

- 2 Limits
- 3 Derivatives
- 4 Integrals
- 5 Multivariable Calculus
  - 5.1 Partial Derivatives
  - 5.2 Gradient
  - 5.3 Divergence and Curl
  - 5.4 Double and Triple Integrals
  - 5.5 Line Integrals
  - 5.6 Surface Integrals
  - 5.7 Green's Theorem
  - 5.8 Stokes' Theorem
  - 5.9 Divergence Theorem