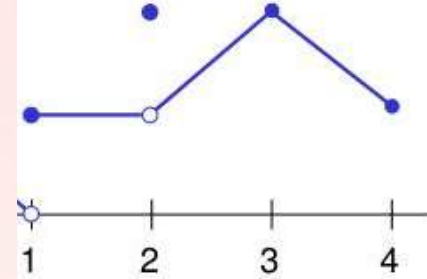


# Limit of a Function in Real Analysis

Welcome to our presentation on the fascinating topic of limits in real analysis. Join us as we explore the concept, properties, types, theorems, and applications of limits in detail.

**KB** by Kajal Bamotra



$\lim_{x \rightarrow 1} f(x)$  does not exist because the left hand limit and right hand limit do not match!

$\lim_{x \rightarrow 1^-} f(x) = 0$  ← left hand limit

$\lim_{x \rightarrow 1^+} f(x) = 1$  ← right hand limit

$f(1) = 0$  ← value of the function at  $x=1$

# Definition of a Limit

1

## Intuitive Understanding

Get a grasp of limits using easily understandable visualizations and examples.

2

## Formal Definition

Dive deep into the mathematical notation and rigor behind defining limits of functions.

3

## Properties of Limits

Explore the fundamental properties of limits, including arithmetic operations, the squeeze theorem, and limits at infinity.

# Types of Limits

## Limits of Polynomial Functions

Discover how limits behave when dealing with polynomial functions of various degrees.

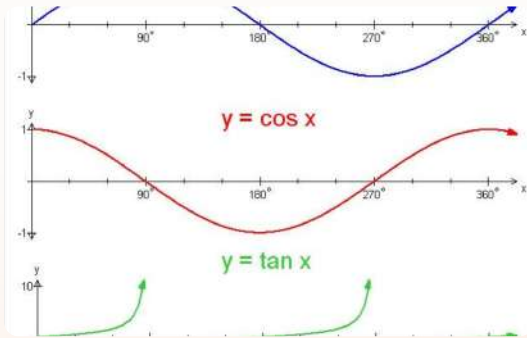
## Limits of Rational Functions

Uncover the intricacies of limits when dealing with rational functions and their asymptotes.

## Limits of Exponential and Logarithmic Functions

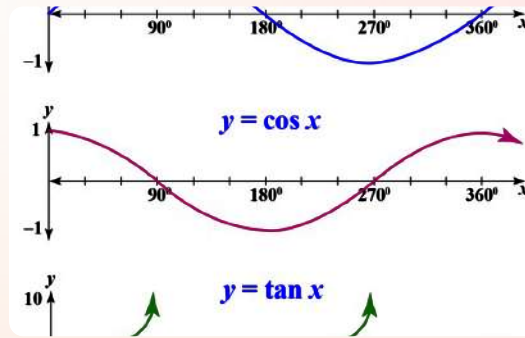
Witness the behaviour of limits when working with exponential and logarithmic functions.

# Limits of Trigonometric Functions



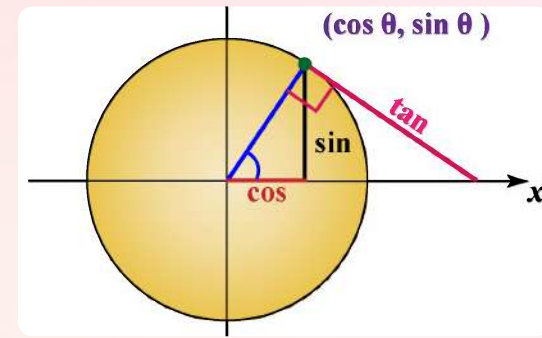
## Sine and Cosine Functions

Explore the fascinating limits of sine and cosine functions and their connection to circular motion.



## Tangent Function

Dive into the intriguing limits of the tangent function and its relationship to slopes.



## Secant Function

Unveil the mysterious limits of the secant function and its connection to fundamental properties of triangles.



# Limit Theorems

1

## Intermediate Value Theorem

Explore the powerful concept of the Intermediate Value Theorem and its implications for continuous functions.

2

## L'Hopital's Rule

Delve into the remarkable L'Hopital's Rule and its application in evaluating limits involving indeterminate forms.

3

## Continuity and Limits

Discover the fascinating relationship between continuity and limits of functions in real analysis.

# Applications of Limits

## Finding Derivatives

Learn how limits play a crucial role in finding derivatives and determining rates of change.

## Evaluating Improper Integrals

See how limits are essential in the evaluation of improper integrals with unbounded intervals or discontinuities.

## Solving Indeterminate Forms

Witness the power of limits in resolving indeterminate forms, such as  $0/0$  or infinity minus infinity.

# Conclusion

In conclusion, exploring the concept of limits in real analysis opens up a new dimension of understanding in mathematics. Limits provide a foundational framework for various calculus concepts and their applications in diverse fields.