

Mathematics 1 - Limits and Continuity

Topics : [Computer engineering](#)

Written on [March 13, 2024](#)

1. Limits:

- A limit describes the behavior of a function as its input approaches a certain value.
- The limit of a function $f(x)$ as x approaches a is denoted by $\lim_{x \rightarrow a} f(x)$ and represents the value that $f(x)$ approaches as x gets closer to a (but not necessarily equal to a).
- If the limit exists and is equal to a finite value, the function is said to be continuous at that point.

2. Types of Limits:

- Left-hand Limit: $\lim_{x \rightarrow a^-} f(x)$ represents the behavior of $f(x)$ as x approaches a from the left side (values less than a).
- Right-hand Limit: $\lim_{x \rightarrow a^+} f(x)$ represents the behavior of $f(x)$ as x approaches a from the right side (values greater than a).
- Infinite Limits: If the limit of a function approaches positive or negative infinity as x approaches a certain value, it's called an infinite limit.

3. Continuity:

- A function is continuous at a point a if three conditions are met:
 1. The function is defined at a .
 2. The limit of the function as x approaches a exists.
 3. The limit of the function as x approaches a is equal to the value of the function at a .
- If a function is continuous at every point in its domain, it's called a continuous function.

4. Types of Discontinuity:

- Removable Discontinuity: A point where a function is not defined or has a hole, but it can be filled in to make the function continuous at that point.
- Jump Discontinuity: A point where the function has a sudden jump from one value to another.
- Infinite Discontinuity: A point where the function approaches positive or negative infinity.
- Asymptotic Discontinuity: A point where the function approaches a vertical asymptote.

5. Properties of Continuous Functions:

- Continuous functions satisfy several important properties, such as the intermediate

value theorem, the extreme value theorem, and the composition of continuous functions is continuous.

© Copyright **Aryatechno**. All Rights Reserved. Written tutorials and materials by [Aryatechno](#)

ARYATECHNO