Info

This note, that was found here, as a part of a collection
is written (completely with human hands) by Rupadarshi Ray,
was created on June 17, 2023 3:03:41 PM,
was last modified on May 17, 2026 7:36:49 PM, and
was exported on September 7, 2026 3:09:55 PM.

Types of discontinuities of functions on $\mathbb{R}$

Definition. Types of discontinuities of functions from a metric space to $\mathbb{R}$

Let X be a metric space, $f : X \to \mathbb{R}$ and $p \in (a, b)$. A discontinuity of f at p is called

- **simple discontinuity** if both $\lim_{x \to p+} f$ and $\lim_{x \to p-} f$ exists
  - **jump discontinuity** if $\lim_{x \to p+} f \neq \lim_{x \to p-} f$
  - **removable discontinuity** if $\lim_{x \to p+} f = \lim_{x \to p-} f \neq f(p)$
- **essential discontinuity** if one of $\lim_{x \to p+} f, \lim_{x \to p-} f$ does not exist
  - $\lim_{x \to p+} f$ does not exist, but $\lim_{x \to p-} f$ exists
  - $\lim_{x \to p+} f$ exists, but $\lim_{x \to p-} f$ does not exist
  - neither $\lim_{x \to p+} f$ not $\lim_{x \to p-} f$ exists

---

Current note has 0 direct children and 0 total descendants.

- stem
  - subobjects of and functions on $\mathbb{R}^n, S^n, \mathbb{C}^n$ and its quotients $_\Gamma\backslash^{\mathbb{R}^n}, _\Gamma\backslash^{\mathbb{C}^n}$
    - R1
      - Types of discontinuities of functions on $\mathbb{R}$

And it has 5 siblings.

- stem
  - subobjects of and functions on $\mathbb{R}^n, S^n, \mathbb{C}^n$ and its quotients $_\Gamma\backslash^{\mathbb{R}^n}, _\Gamma\backslash^{\mathbb{C}^n}$
    - R1
      - Types of discontinuities of functions on $\mathbb{R}$
      - Extremum of functions $\mathbb{R} \to \mathbb{R}$
      - Fixed points of functions $U \subseteq \mathbb{R} \to U$
      - $\lim_{x \to a} \frac{f(x)}{g(x)}$ of functions $f, g : U \subseteq \mathbb{R} \to \mathbb{R}$
      - Total variation and sequence of continuous functions