

§ 0 Overview

\mathbb{R} : the set of all real numbers

Rich structure on \mathbb{R} :

- Addition $+$ with 0
 - Multiplication \times with 1
 - Absolute value $|p-q|$ (distance between 2 points)
- ↓
- Open neighborhood $\{|x-x_0| < \varepsilon\}$
 - Function $f: \mathbb{R} \rightarrow \mathbb{R}$
 - limits of functions
 - continuity
 - differentiability
 - integrability
 - etc ...
- ↓
- } field structure
 - } metric structure
 - } topological structure

Further "simple" question:

Generalization? (i.e. Any space with similar structure?)

Content of this course:

- Elementary analysis on \mathbb{R}
- Topological space
- Metric space

Reference:

- [1] Robert G. Bartle, Donald R. Sherbert, Introduction to Real Analysis
- [2] James R. Munkres, Topology
- [3] Erwin Kreyszig, Introduction to Functional Analysis