

1 Course Description

1.1 Title

18.04A = Real Analysis

Purpose:

- Gain experience with proofs
- Prove statements about the real numbers, functions, and limits ("analysis")

2 Set Theory

2.1 Definitions

- Define sets:
 1. A set A is a subset of B , denoted by $A \subseteq B$, if for all $a \in A$, $a \in B$.
 2. Two sets are equal, $A = B$, if $A \subseteq B$ and $B \subseteq A$.
 3. A is a proper subset of B , denoted by $A \subsetneq B$, if $A \subseteq B$ and $A \neq B$.

Lecture Title

Description of the lecture

1. A set A is a subset of B , $A \subseteq B$, if $a \in A \implies a \in B$
2. Two sets are equal, $A = B$, if $A \subseteq B$ and $B \subseteq A$
3. A is a proper subset of B , $A \subsetneq B$, if $A \subseteq B$ and $A \neq B$
4. Set building notation $\{x \mid P(x)\}$
 1. $N = \{1, 2, 3, 4, \dots\}$
 2. $Z = \{0, 1, -1, -2, \dots\}$
 3. $Q = \{m \div n \mid m, n \in Z, n \neq 0\}$
 4. $R = \{\text{real numbers} \cup \{\text{irrational numbers}\}\}$ along with irrationals like $\pi, \sqrt{2}, \dots$
 5. $N = \{2m - 1 \mid m \in N\}$
 6. $C = \{1, 3, 5, \dots\}$
1. The union of A, B is the set $A \cup B = \{x \mid x \in A \text{ or } x \in B\}$
2. The intersection of A, B is the set $A \cap B = \{x \mid x \in A \text{ and } x \in B\}$
3. The set $P(x)$