

**Math 35: Real Analysis**  
**Winter 2018**

**General notation**

**1.) Numbers**

Symbol	Name	Description
$\mathbb{Z}$	integers	$\{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$
$\mathbb{N}$ or $\mathbb{Z}^+$	natural numbers or pos. integers	$\{1, 2, 3, 4, \dots\}$
$\mathbb{Q}$	rational numbers or fractions	Examples: $\frac{1}{2}, -\frac{13}{7}$
$\mathbb{R}$	real numbers	Examples: $\sqrt{2}, \pi, -\frac{3}{7}$
$\mathbb{R}^+$	positive real numbers	$\{x \in \mathbb{R}, x > 0\}$
$\mathbb{R}^-$	negative real numbers	$\{x \in \mathbb{R}, x < 0\}$
$\mathbb{R}^*$ or $\mathbb{R} \setminus \{0\}$	real numbers without zero	$\{x \in \mathbb{R}, x \neq 0\}$

**2.) Sets**

Symbol	Name	Description
$\emptyset$	empty set	set that has no elements
$\in$	in	Example: $1 \in \mathbb{Q}$
$\notin$	not in	Example: $\sqrt{2} \notin \mathbb{Q}$
$A \cap B$	intersection	$\{x, \text{ such that } x \in A \text{ and } x \in B\}$
$A \cup B$	union	$\{x, \text{ such that } x \in A \text{ or } x \in B\}$
$A \uplus B$	disjoint union	$A \cup B$ , where $A \cap B = \emptyset$
$A \setminus B$	difference	$\{x, \text{ such that } x \in A \text{ and } x \notin B\}$
$\bigcup_{n \in \mathbb{N}} A_n$	infinite union	$\{x, \text{ such that } x \in A_n \text{ for some } n \in \mathbb{N}\}$
$\bigcap_{n \in \mathbb{N}} A_n$	infinite intersection	$\{x, \text{ such that } x \in A_n \text{ for all } n \in \mathbb{N}\}$

**3.) Logic**

Symbol	Name	Description
$\Rightarrow$	implies	Example: $x \geq 1 \Rightarrow x^2 \geq x$
$\Leftrightarrow$	equal	Example: $x^2 \leq x \Leftrightarrow x \in [0, 1]$
$\forall$	for all	Example: $\forall x \in [2, 4] : x^2 > x$
$\exists$	exists	Example: $\forall x \in \mathbb{R} \exists y \in \mathbb{Q}, \text{ such that }  x - y  < 0.01$
$\exists_1$	exists exactly one	Example: $\forall x \in \mathbb{R}^+ \exists_1 y \in \mathbb{R}^+, \text{ such that } y^2 = x$
$\nexists$	does not exist	Example: For $x = -4 \nexists y \in \mathbb{R}, \text{ such that } y^2 = x$