
Set theory and Logic

Aiken Ji

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Conventions

\mathbb{F} denotes either \mathbb{R} or \mathbb{C} .

\mathbb{N} denotes the set $\{1, 2, 3, \dots\}$ of natural numbers (excluding 0).

Inner products are taken to be linear in the first argument and conjugate linear in the second.

The Einstein summation convention is used for tensors unless otherwise specified.

1 Language of set theory

We construct a formal language suitable for describing sets. The language consists of some mathematical symbols as well as purely logical symbols.

Definition 1.1. symbols of logic

Here is a table of all purely logical symbols needed for set theory:

The complete list of symbols of language is as below:

Definition 1.2. symbols in LOST(Language of Set Theory)

1. variable: v_0, v_1, v_2, \dots
2. equality: $=$
3. membership: \in
4. connectives: $\neg, \wedge, \vee, \rightarrow$
5. quantifiers: \forall, \exists
6. parentheses: $(,)$

Proposition 1.3

$$(\exists v_i \in v_j)\Phi \Leftrightarrow (\exists v_i)((v_i \in v_j) \wedge \Phi)$$