Notes

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Part I

Basics

Chapter 1

Set Theory

1.1 Notation

Let A, B, and I(a set of indexes) be sets, then the following operations are defined.

$$(a, b) := \{a, \{a, b\}\}$$

$$A \cup B$$

$$A \cap B$$

$$A \times B, \quad A\Pi B := \{(a, b) \mid a \in A \text{ and } b \in B\}$$

$$A\Pi$$

Following are some ways the above operations may be generalized to multiple sets.

$$\bigcup_{i=0}^{n} A_i, \quad \bigcup_{i \in I} A_i, \quad \bigcup_{S \in \mathscr{I}} S$$

1.2 Naive set theory

1.3 Zermelo-Fraenkel set theory

Axioms

1. Axiom of extensionality

2. Axiom of regularity (also called the axiom of foundation)

3. Axiom schema of specification (also called the axiom schema of separation or of restricted comprehension)

4. Axiom of pairing

5. Axiom of union

6. Axiom schema of replacement

7. Axiom of infinity

8. Axiom of power set

9. Well-ordering theorem

Chapter 2

Logic

Chapter 3

Type Theory