Encyclopedia of Mathematics

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Contents

Chapter 1

Set Theory

1.1 Primitive Notions

Let there be *sets*.

Let there be a binary relationship between sets called *membership*, denoted $\in$. If $a \in b$ we say a is a *member* or *element* of b, or b *contains* a, and also write $b \ni a$. If this does not hold, we write $a \notin b$ or $b \not\ni a$.

1.2 Classes

We speak informally about *classes*. A *class* is determined by a unary predicate. We write $\{x : P(x)\}$ or $\{x \mid P(x)\}$ for the class determined by the predicate P.

Given a class $\mathbf{A} := \{x : P(x)\}$ and a set a, we say a is a *member* or *element* of the class $\mathbf{A}$ or $\mathbf{A}$ *contains* a, and write $a \in \mathbf{A}$ or $\mathbf{A} \ni a$, iff $P(a)$. If this does not hold, we write $a \notin \mathbf{A}$ or $\mathbf{A} \not\ni a$.

We say that two classes $\mathbf{A}$ and $\mathbf{B}$ are *equal*, and write $\mathbf{A} = \mathbf{B}$, iff they have exactly the same members. When this does not hold, we write $\mathbf{A} \neq \mathbf{B}$.

Proposition Schema 1 *For any classes* $\mathbf{A}$*,* $\mathbf{B}$ *and* $\mathbf{C}$*:*

- $\mathbf{A} = \mathbf{A}$
- *If* $\mathbf{A} = \mathbf{B}$ *then* $\mathbf{B} = \mathbf{A}$
- *If* $\mathbf{A} = \mathbf{B}$ *and* $\mathbf{B} = \mathbf{C}$ *then* $\mathbf{A} = \mathbf{C}$*.*