MODULE NAME

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YEAR(S)

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Chapter 1

First chapter

1.1 Naive Set Theory

1.1.1 Definitions

Definition 1.1.1: Sets

A *set* is a (possibly empty) collection of objects. Generally, upper case letters will be used to denote sets while lower case letters refer to objects in some set. The objects in a set are called the *elements/members* of the set. If S is a set, the notation $x \in S$ means that x is an element of S.

Definition 1.1.2: Empty set

A set is an *empty set* if it has no elements.

Definition 1.1.3: Set equality

Let S and T be sets. They are said to be *equal*, denoted $S = T$, if they have the same elements.

Definition 1.1.4: Finite sets

A set S is called *finite* if there it has n elements where n is a non-negative integer. For a non-empty set with n elements, let $s_1, \ldots, s_n$ be its members and write $S = \{s_1, \ldots, s_n\}$.

1.1.2 Some results

Theorem 1.1.1: Uniqueness of the empty set

There is only one empty set, denoted by $\emptyset$.

Proof of theorem 1.1.1. Suppose that S and T are empty sets. Then there is no element of S which is not in T and there is no element of T which is not in S. Therefore S and T have the same elements, so $S = T$. □

Theorem 1.1.2: Repeated elements do not count

Suppose S is a non-empty set with some repeated elements. Then S is equal to S after repetitions have been removed.

Proof of theorem 1.1.2. Every element of S is also an element of S after repetitions have been removed, and vice versa. □

Example 1.1.1: Example showing repetition does not matter

$\{1, 3, 2, 3, 2\} = \{1, 2, 3\}$.

Appendix A

First appendix