Sets

1 Why

We want to talk about none, one, or several objects considered as an abstract whole.

2 Definition

A *set* is an abstract object. We think of it as several objects considered as a whole. A set *contains* the objects so considered. These objects are the *members* or *elements* of the set. The objects a set contains may be other sets. This may be subtle at first glance, but becomes familiar with experience.

We call a set which contains no objects *empty*. Otherwise we call a set *nonempty*.

2.1 Notation

We tend to denote sets by upper case Latin letters: for example, A, B, and C. To aid our memory, we tend to use the lower case form of the letter for an element of the set. For example, let A and B be nonempty sets. We tend to denote by a an element of A, and similarly, by b an element of B

We denote that an object a is an element of a set A by $a \in A$. We read the notation $a \in A$ aloud as "a in A." The $\in$ is a stylized lower case Greek letter ε. It is read aloud "ehp-sih-lawn" and is a mnemonic for “element of". If A is not an element of A, we write $a \notin A$, read aloud as “a not in A."

Suppose a set has few elements, and we can list them. If we give the objects names, then let us denote the set by listing the names of its elements between braces. For example, let a, b, and c be distinct objects. Denote by $\{a, b, c\}$ the set containing these objects and only these objects. We can further compress notation, and denote this set of objects by A: so, $A = \{a, b, c\}$. Then $a \in A$, $b \in A$, and $c \in A$. Moreover, if d is an object and $d \in A$, then $d = a$ or $d = b$ or $d = c$.

Let a be an object. Note that $a \neq \{a\}$. The left hand side, a, is the object a. The right hand side, $\{a\}$, is the set whose element is the object a. We distinguish the set containing one element from the element itself.