Sets

1 Why

We want to talk about none, one, or several objects considered as a whole, for which we will use the word *set*.

2 Definition

test

A **set** is an abstract object which we think of as several objects considered at once. We say that the set **contains** the objects so considered. We call these the **elements** of the set.

We call the set which contains no objects the **empty set**. We call a set which contains only a single object a **singleton**. A singleton is not the same as the object it contains. Besides these two cases, we think of sets as containing two or more objects.

The objects a set contains may be other sets. This may be subtle at first glance, but becomes familiar with experience.

2.1 Notation

Let us tend to denote sets by upper case Latin letters: for example, A, B, and C. To aid our memory, let us tend to use the lower case form of the letter for an element of the set. For example, let A and B be non-empty sets. Let us tend to denote by a an element of A, and likewise, by b an element of B

Let us 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". We write $a \notin A$, read aloud as "a not in A," if a is not an element of A.

If we have named the elements of a set, and can list them, let us do so between braces. For example, let a, b, and c be three distinct objects. Denote by $\{a, b, c\}$ the set containing theses three objects and only these three objects. We can further compress notation, and denote this set of three 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 $d = c$.

We denote the empty set by $\varnothing$. Note that $\varnothing \neq \{\varnothing\}$. The left hand side, $\varnothing$, is the empty set. The right hand side, $\{\varnothing\}$, is the singleton whose element is the empty set. We distinguish the set containing one element from the element itself.