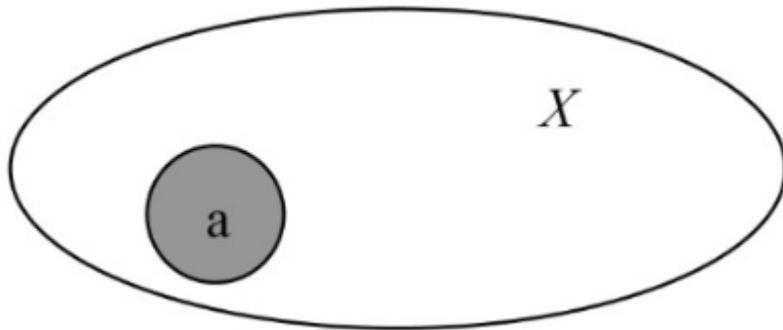


Mathematical set is the totality of well-defined objects. The objects which belong to the set are called the *elements*.

This state of belonging to a given set is called relation, which has the following sign:  $a \in X$

You may read the given relation like this: "the elements of  $X$  set", or " $X$  set contains the following elements".

The elements of a set:



The number of the elements which belong to a give set is called the cardinality of the set. This cardinal may be finite or infinite.

The elements (which belong to a given set) can be defined by enumeration or by giving an exact principle of how they belong to that set.

For example:

The set of natural numbers:

$\$ \$ Z = \{1, 2, 3, 4, 5, \dots\} \$ \$$

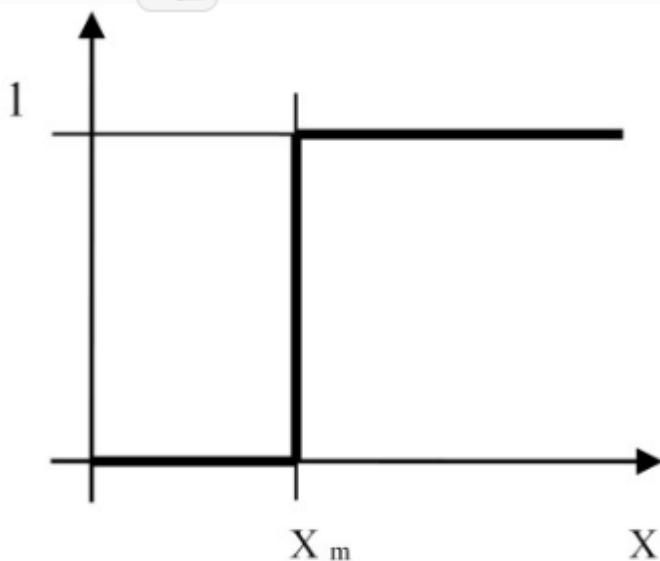
You may define the elements by writing them: List the natural, odd integers from one to ten:

$\$ \$ A = \{1, 3, 5, 7, 9\} \$ \$$

or

$\$ \$ A = \{x \mid x \text{ is an odd integer and } 1 \leq x < 10\} \$ \$$

The sets (and their belongings) are usually set in a sharp way.



$$X \geq X_m$$

In information technology it is possible to use sets which contain fuzzy elements as well.

In these cases the value of how an element is connected to a given set is defined by a '*membership function*'  $\mu(x)$

Fuzzy sets are a generalization of classical sets used in mathematics and logic to *handle uncertainty* and *partial membership*. Unlike classical sets where an element either belongs or does not belong to a set (membership is binary: 0 or 1), fuzzy sets allow for degrees of membership, represented by values between 0 and 1.

From:  
<https://edu.iit.uni-miskolc.hu/> - **Institute of Information Science - University of Miskolc**

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Last update: **2024/08/26 16:26**

