Sets

Describing Sets

By word *set*, we mean any collection of objects: numbers, letters, $\ldots$. Most of the sets we will consider will consist either of numbers or points in the plane. Objects of the set are usually referred to as *elements* of this set.

Sets are usually described in one of two ways:

- By explicitly listing all elements of the set. In this case, curly brackets are used, e.g. $\{1, 2, 3\}$.
- By giving some conditions, e.g. "set of all numbers satisfying equation $x^2 > 2$". In this case, the following notation is used: $\{x \mid \ldots\}$, where dots stand for some condition (equation, inequality, $\ldots$) involving x, denotes the set of all x satisfying this condition. For example, $\{x \mid x^2 > 2\}$ means "set of all x such that $x^2 > 2$".

Members of sets

Sometimes we might have to say whether the element belongs to the set or not. In this case the following notation is used:

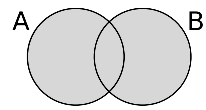
- $x \in A$ means "x is in A", or "x is an element of A"
- $x \notin A$ means "x is not in A"

Set Operations

There are several operations that can be used to get new sets out of the old:

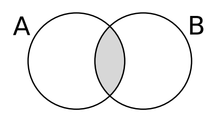
- $A \cup B$: *union* of A and B. It consists of all elements which are in either A or B (or both):

$$A \cup B = \{x \mid x \in A \text{ OR } x \in B\}.$$



- $A \cap B$: *intersection* of A and B. It consists of all elements which are in both A and B:

$$A \cap B = \{x \mid x \in A \text{ AND } x \in B\}.$$



- $\overline{A}$: *complement* of A, i.e. the set of all elements which are not in A: $\overline{A} = \{x \mid x \notin A\}$.