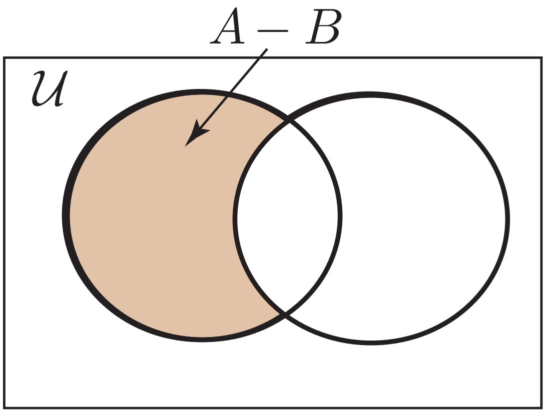
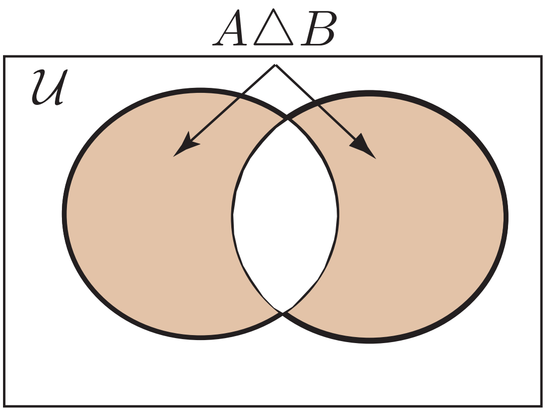
Set difference (or complement of B relative to A)

$A - B$ (or $A \backslash B$) $= \{x : x \in A$ and $x \notin B\}$.



Symmetric difference

$$\begin{aligned} A \triangle B &= (A \cup B) - (A \cap B) \\ &= \{x : (x \in A \text{ and } x \notin B) \text{ or } (x \notin A \text{ and } x \in B)\} \end{aligned}$$



Cartesian Product

$A \times B = \{(a, b) : a \in A$ and $b \in B\}$

Union and intersection of an arbitrary number of sets

$$\cup_{i=1}^{n} A_i = A_1 \cup A_2 \cup A_3 \cup \ldots \cup A_n$$

$$\cap_{i=1}^{n} A_i = A_1 \cap A_2 \cap A_3 \cap \ldots \cap A_n$$

Power set

The **power set**, $P(X)$, of a set X is the set of all subsets (including the empty set) of X. For example,

if $X = \{a, b, c\}$ then

$P(X) = \{\{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\}, \emptyset\}$.

Set cardinality

$|A|$ = the **cardinality** of the set A, that is, the number of distinct elements of the set. So if $A = \{1, 2, 3, 3, 8\}$ then $|A| = 4$.

For any sets A, B, C and X,

$$|A \cup B| = |A| + |B| - |A \cap B|.$$

$$|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |A \cap C| - |B \cap C| + |A \cap B \cap C|.$$

$$|A \times B| = |A|\,|B|$$

$|P(X)| = 2^n$ where $n = |X|$.

---

v1. June 2008

primary content by Mark McCartney. Series edited and typeset by Tony Croft.