Set

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Contents

1 A set is an unordered collection of elements.

1.1 Operations include:

Membership: $x \in S$ and $x \notin S$
Set inclusion: $s \subset S$ and $s \subseteq S$
Union: $A \cap B$
Intersection: $A \cup B$
Compliment: $B^c \equiv \{s \mid s \notin B\}$ or $\overline{B}$
Subtraction: $A - B \equiv \{a \mid a \in A \land a \notin B\}$
Universal set: $\text{Univ} \equiv A \cap A^c$
Cardinality (number of elements in set): $|A|$
Equality: $A = B \equiv A \subseteq B \land B \subseteq A$
Cartesian product: $A \times B \equiv \{(a, b) \mid a \in A \land b \in B\}$
Collective intersection: $\bigcup_n S_n \equiv S_0 \cup S_1 \cup \cdots \cup S_n$
Collective union: $\bigcap_n S_n \equiv S_0 \cap S_1 \cap \cdots \cap S_n$

1.2 Common laws:

1.2.1 Demorgan:

$\overline{A \cap B} = \bar{A} \cup \bar{B}$

$\overline{A \cup B} = \bar{A} \cap \bar{B}$
In general,
$\overline{\bigcap S_n} = \bigcup \overline{S_n}$
and
$\overline{\bigcup S_n} = \bigcap \overline{S_n}$

1.2.2 Cardinality

$|A \cap B| = |A| + |B| - |A \cup B|$
$|A \cup B| = |A| + |B| - |A \cap B|$
$|A \times B| = |A| \times |B|$
With the Powerset:
$|\mathcal{P}(S)| = 2^{|S|}$