Set Identities

Set Identities

Intersection, Union, and Element Of

Intersection

$x \in A \cap B \leftrightarrow (x \in A) \wedge (x \in B)$

Union

$x \in A \cup B \leftrightarrow (x \in A) \vee (x \in B)$

Element of

$x \in \overline{A} \leftrightarrow \neg(x \in A)$

True and False

- True and false correspond with the universal and empty sets.

Something exists in the universal set

$x \in U \leftrightarrow T$

Nothing exists in the empty set

$x \in \varnothing \leftrightarrow F$

Table of Set Identities

Name	Identities	
Idempotent laws	$A \cup A = A$	$A \cap A = A$
Associative laws	$(A \cup B) \cup C = A \cup (B \cup C)$	$(A \cap B) \cap C = A \cap (B \cap C)$
Commutative laws	$A \cup B = B \cup A$	$A \cap B = B \cap A$

Name	Identities	
Distributive laws	$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$	$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
Identity laws	$A \cup \varnothing = A$	$A \cap U = A$
Domination laws	$A \cap \varnothing = \varnothing$	$A \cup U = U$
Double complement law	$\overline{\overline{A}} = A$	
Complement laws	$A \cap \overline{A} = \varnothing$ $\overline{U} = \varnothing$	$A \cup \overline{A} = U$ $\overline{\varnothing} = U$
De Morgan's laws	$\overline{A \cup B} = \overline{A} \cap \overline{B}$	$\overline{A \cap B} = \overline{A} \cup \overline{B}$
Absorption laws	$A \cup (A \cap B) = A$	$A \cap (A \cup B) = A$