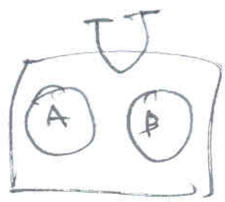
1/ 3/12 Sets

Def. $\cup$, $\cap$

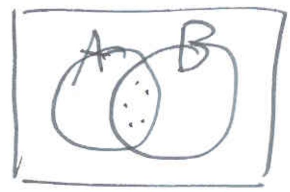
$\emptyset = \{x \in U \mid p(x) = F\} = \{x \mid F\}$

disjoint

$A \cap B = \emptyset$

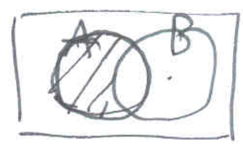


$|A \cup B| = |A| + |B| - |A \cap B|$



Def.4 Difference

$A - B = \{x \in U \mid x \in A, x \notin B\}$



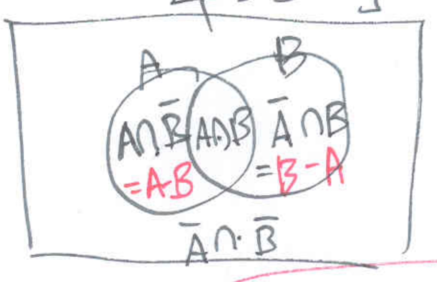
Universe

Def.5 Complement

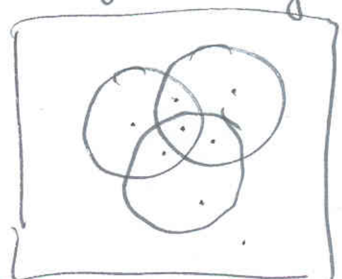
$\bar{A} = U - A = \{x \mid x \in U, x \notin A\} = \{x \in U \mid x \notin A\}$

Venn diagram

$4 = 2^2$ reg.



$8 = 2^3$ reg



Four cases

① $A = B$, $A \cap \bar{B} = \emptyset \wedge \bar{A} \cap B = \emptyset$

② $A \subseteq B$, $B \subseteq A$ $A \cap \bar{B} = \emptyset$ $\bar{A} \cap B = \emptyset$

③ Disjoint $A \cap B = \emptyset$, $A \cap B = \emptyset$

④ otherwise

set ~~equivalence~~ Identity rules (See table 1 of Sec. 2.2)

(compare table 6 of Sec. 1.2)

$(\{T,F\}, \vee, \wedge, \neg, T, F)$ vs $(2^U, \cup, \cap, {}^-, U, \emptyset)$

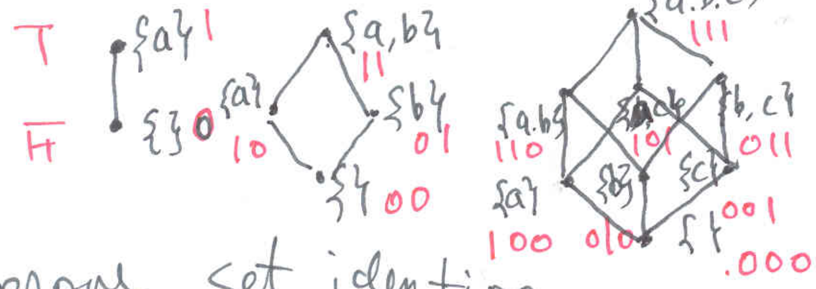
$\vee, \wedge : \{T,F\} \times \{T,F\} \to \{T,F\}$, $\cup, \cap : 2^U \times 2^U \to 2^U$

binary operation on $\{T,F\}$

$\neg : \{T,F\} \to \{T,F\}$ $\quad {}^- : 2^U \to 2^U$

unary $\neg$. "

$\{a,b,c,d\}$



To prove set identies

① i) $A \subseteq B$

ii) $B \subseteq A$

② membership table

2^n membership regions when n set variables.

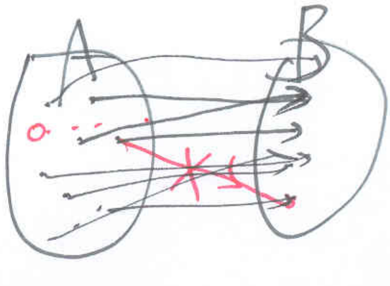
(2^n truth table entry when n proposital var.)

$\sum_{i=1}^{k} a_k$: $\bigcup_{i=1}^{n} A_i$ or $\bigcup_{i \in \{1, \dots, n\}} A_i$

index variable

index set

Function



$f : A \to B$ $\qquad f \subseteq A \times B$.

① every elemnts in A : total

② exactly one elements in B : unique

$a \in A$, $f(\underbrace{a) = b}) \in B$ $\qquad (a, \overset{}{\underset{b}{f(a)}}) \in f$.