

Theorem 6.2.2

Set Identities

Let all sets below be subsets of a universal set U .

- ① **Commutative Laws** For all sets A and B ,
 - Ⓐ $A \cup B = B \cup A$
 - Ⓑ $A \cap B = B \cap A$
- ② **Associative Laws** For all sets A, B , and C ,
 - Ⓐ $(A \cup B) \cup C = A \cup (B \cup C)$
 - Ⓑ $(A \cap B) \cap C = A \cap (B \cap C)$
- ③ **Distributive Laws** For all sets A, B , and C ,
 - Ⓐ $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
 - Ⓑ $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
- ④ **Identity Laws** For any set A ,
 - Ⓐ $A \cup \emptyset = A$
 - Ⓑ $A \cap U = A$
- ⑤ **Complement Laws** For any set A ,
 - Ⓐ $A \cup A^c = U$
 - Ⓑ $A \cap A^c = \emptyset$
- ⑥ **Double Complement Law** For any set A ,
 $(A^c)^c = A$.

Theorem 6.2.2 (continued)

Let all sets below be subsets of a universal set U .

⑦ Idempotent Laws For any set A ,

Ⓐ $A \cup A = A$

Ⓑ $A \cap A = A$

⑧ Universal Bound Laws For any set A ,

Ⓐ $A \cup U = U$

Ⓑ $A \cap \emptyset = \emptyset$

⑨ DeMorgan's Laws For any sets A and B ,

Ⓐ $(A \cup B)^c = A^c \cap B^c$

Ⓑ $(A \cap B)^c = A^c \cup B^c$

⑩ Absorptions Laws For any sets A and B ,

Ⓐ $A \cup (A \cap B) = A$

Ⓑ $A \cap (A \cup B) = A$

⑪ Complements of U and \emptyset

Ⓐ $U^c = \emptyset$

Ⓑ $\emptyset^c = U$

⑫ Set Difference Law For all sets A and B ,

$$A - B = A \cap B^c$$