Set Identities

A, B and C are sets, and we consider them to be subsets of a universal set U. Remember that $\emptyset$ is the empty set, and that A^c means"the complement" of A.

1. Commutative Laws:
$$A \cup B = B \cup A$$
$$A \cap B = B \cap A$$

2. Associative Laws:
$$(A \cup B) \cup C = A \cup (B \cup C)$$
$$(A \cap B) \cap C = A \cap (B \cap C)$$

3. Distributive Laws:
$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$$
$$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$$

4. Identity Laws:
$$A \cup \emptyset = A$$
$$A \cap U = A$$

5. Complement Laws:
$$A \cup A^c = U$$
$$A \cap A^c = \emptyset$$

6. Double Complement Laws:
$$(A^c)^c = A$$

7. Idempotent Laws:
$$A \cup A = A$$
$$A \cap A = A$$

8. Universal Bound Laws:
$$A \cup U = U$$
$$A \cap \emptyset = \emptyset$$

9. De Morgan's Laws:
$$(A \cup B)^c = A^c \cap B^c$$
$$(A \cap B)^c = A^c \cup B^c$$

10. Absorption Laws:
$$A \cup (A \cap B) = A$$
$$A \cap (A \cup B) = A$$

11. Complements of U and $\emptyset$:
$$U^c = \emptyset$$
$$\emptyset^c = U$$

12. Set Difference Law:
$$A - B = A \cap B^c$$