

Chapter 1

Number Sets

1.1 Set Identities

Sets: A, B, C

Universal set: I

Complement : A'

Proper subset: $A \subset B$

Empty set: \emptyset

Union of sets: $A \cup B$

Intersection of sets: $A \cap B$

Difference of sets: $A \setminus B$

1. $A \subset I$
2. $A \subset A$
3. $A = B$ if $A \subset B$ and $B \subset A$.
4. Empty Set
 $\emptyset \subset A$
5. Union of Sets
 $C = A \cup B = \{x \mid x \in A \text{ or } x \in B\}$

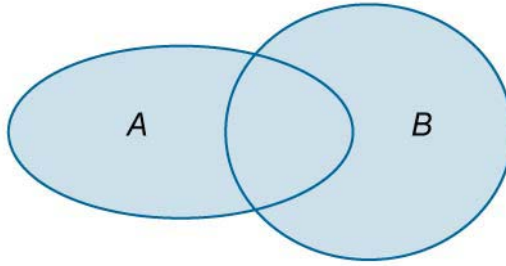


Figure 1.

6. Commutativity

$$A \cup B = B \cup A$$

7. Associativity

$$A \cup (B \cup C) = (A \cup B) \cup C$$

8. Intersection of Sets

$$C = A \cap B = \{x \mid x \in A \text{ and } x \in B\}$$

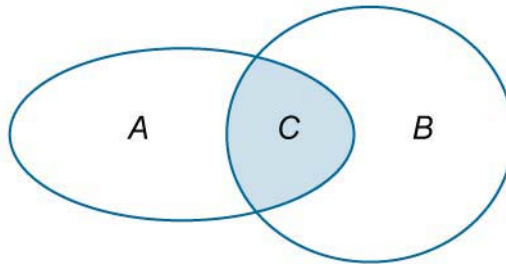


Figure 2.

9. Commutativity

$$A \cap B = B \cap A$$

10. Associativity

$$A \cap (B \cap C) = (A \cap B) \cap C$$

11. Distributivity

$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C),$$

$$A \cap (B \cup C) = (A \cap B) \cup (A \cap C).$$

12. Idempotency

$$A \cap A = A,$$

$$A \cup A = A$$

13. Domination

$$A \cap \emptyset = \emptyset,$$

$$A \cup I = I$$

14. Identity

$$A \cup \emptyset = A,$$

$$A \cap I = A$$

15. Complement

$$A' = \{x \in I \mid x \notin A\}$$

16. Complement of Intersection and Union

$$A \cup A' = I,$$

$$A \cap A' = \emptyset$$

17. De Morgan's Laws

$$(A \cup B)' = A' \cap B',$$

$$(A \cap B)' = A' \cup B'$$

18. Difference of Sets

$$C = B \setminus A = \{x \mid x \in B \text{ and } x \notin A\}$$

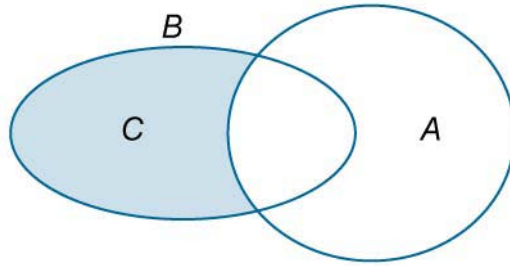


Figure 3.

- 19. $B \setminus A = B \setminus (A \cap B)$
- 20. $B \setminus A = B \cap A'$
- 21. $A \setminus A = \emptyset$
- 22. $A \setminus B = A$ if $A \cap B = \emptyset$.

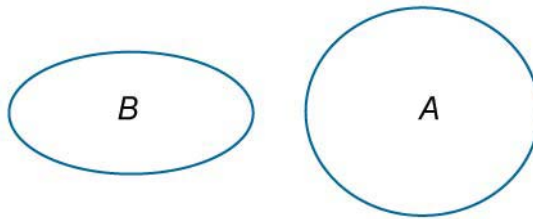


Figure 4.

- 23. $(A \setminus B) \cap C = (A \cap C) \setminus (B \cap C)$
- 24. $A' = I \setminus A$
- 25. Cartesian Product
 $C = A \times B = \{(x, y) \mid x \in A \text{ and } y \in B\}$