Math Formulas: Set Identities

Definitions:

Universal set : I

Empty set: $\varnothing$

Union of sets

1. $$A \cup B = \{x : x \in A \;\; or \;\; x \in B\}$$

Intersection of sets

2. $$A \cap B = \{x : x \in A \;\; and \;\; x \in B\}$$

Complement

3. $$A' = \{x \in I : x \notin A\}$$

Difference of sets

4. $$A \setminus B = \{x : x \in A \;\; and \;\; x \notin B\}$$

Cartesian product

5. $$A \times B = \{(x,y) : x \in A \;\; and \;\; y \in B\}$$

Set identities involving union

Commutativity

6. $$A \cup B = B \cup A$$

Associativity

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

Idempotency

8. $$A \cup A = A$$

Set identities involving intersection

Commutativity

9. $$A \cap B = B \cap A$$

Associativity

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

Idempotency

11. $$A \cap A = A$$

Set identities involving union and intersection

Distributivity

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

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

Domination

14. $$A \cap \varnothing = \varnothing$$

15. $$A \cup I = I$$

Identity

16. $$A \cup \varnothing = \varnothing$$

17. $$A \cap I = A$$

Set identities involving union, intersection and complement

Complement of intersection and union

18. $$A \cup A' = I$$

19. $$A \cap A' = \varnothing$$

De Morgan's laws

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

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

Set identities involving difference

22. $$B \setminus A = B \setminus (A \cup B)$$

23. $$B \setminus A = B \cap A'$$

24. $$A \setminus A = \varnothing$$

25. $$(A \setminus B) \cap C = (A \cap C) \setminus (B \cap C)$$

26. $$A' = I \setminus A$$