Probability Formulas

Basic Probability Formula

1. $P(A) = \frac{\text{Number of favorable outcomes}}{\text{Total number of outcomes}}$

Complementary Probability

2. $P(A') = 1 - P(A)$

   - Where $P(A')$ is the probability of the complement of event A.

Addition Rule for Probability

3. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

   - Where $P(A \cup B)$ is the probability of either event A or event B occurring.
   - $P(A \cap B)$ is the probability of both events A and B occurring.

Conditional Probability

4. $P(A|B) = \frac{P(A \cap B)}{P(B)}$

   - Where $P(A|B)$ is the probability of event A occurring given that event B has occurred.

Multiplication Rule for Probability

5. $P(A \cap B) = P(A) \times P(B|A)$

   - For dependent events A and B.

6. $P(A \cap B) = P(A) \times P(B)$

Total Probability Theorem

7. $P(B) = P(B|A)P(A) + P(B|A')P(A')$

   - Where A and A' are mutually exclusive and exhaustive events.

Bayes' Theorem

8. $P(A|B) = \frac{P(B|A) \cdot P(A)}{P(B)}$

Permutations and Combinations

9. $nPr = \frac{n!}{(n-r)!}$

   - Where n is the total number of items, and r is the number of items to choose.

10. $nCr = \frac{n!}{r!(n-r)!}$

    - Where n is the total number of items, and r is the number of items to choose without regard to order.

Probability of Mutually Exclusive Events

11. $P(A \cup B) = P(A) + P(B)$

    - If A and B are mutually exclusive events.

Probability of Non-Mutually Exclusive Events

12. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$