Classical Probability:

Outcome for random exp. are equally likely or mutually exclusive

Equally likely

Each outcome of an exp. has the same chances of appearing as any other. (Same chance of occuring)

Mutually Exclusive

One & only one of them can take place at a time. (On tossing you either get heads or tail)

Probability of an event =

$$\frac{\text{No. of outcomes where event occurs}}{\text{Total no. of possible outcome}}$$

→ Apriori approach only deals with coin, card & dice game.

→ Cannot deal for large no. of trials

→ Cannot give answers to complex question

Axioms

→ The prob. of an event ranges from 0 to 1.

→ The prob. of entire sample space is 1.

→

→ If A & B are mutually exclusive disjoint events, then prob. of occurrence of A or B is given by:

$$\cancel{P(A \cup B) = P(A) + P(B) - P(A \cap B)}$$

$$\boxed{P(A \cup B) = P(A) + P(B)}$$

$$\boxed{P(A \cup B \cup C) = P(A) + P(B) + P(C)}$$

$$P(A_1 \cup A_2 \cup A_3 \cdots) = \sum_{i=1}^{\infty} P(A_i)$$

If you take out a card from a regular pack of cards, what is the probability that the card is either Ace or spade.

4 Aces   13 Spades including one Ace

$$\therefore P(A \cup S) = \frac{16}{52} = \frac{4}{13}$$

$$P(A) = \frac{1}{13} \qquad P(S) = \frac{\cancel{13}}{\cancel{52}\,4} = \frac{1}{4}$$

$$P(A \cap S) = \frac{1}{52}$$

Relative Frequency:

The method uses relative freq. of past occurrence as probability

Two characteristics:

1) The observed rel. ~~freq~~ freq. of an event in a very large no. of trials

2) The proportion of time that an event occurs in the long run when conditions ~~are~~ are stable

$$P(A) = \frac{a \text{ (Outcome)}}{n \text{ (no. of possible outcomes/trials)}}$$

Permutation

$$^{n}P_{r} = \frac{n!}{(n-r)!}$$

$$^{n}C_{r} = \frac{n!}{r!\,(n-r)!}$$

Conditional Prob.

$P(A/B) =$ Prob. of A given B

$$\boxed{P(A/B) = \frac{P(A \cap B)}{B}}$$

Multiplication Rule:

Independent prob.

$$\boxed{P(A \cap B) = P(A) \cdot P(B)}$$

Dependent prob.

$$P(A \cap B) = P(A/B) \cdot P(B)$$

$$P(A \cap B) = P(B/A) \cdot P(A)$$