(4) Probability

(i) → Relationship b/n prob & stats?

→ Probability is a mathematical concept used in statistics and vice versa. ∴ they are interconnected fields

(ii) → Probability is measure of how likely event will occur.

→ B/n 0 & 1.

→ $P(E) = \frac{\text{desired Outcomes}}{\text{Total outcomes}}$.

(iii) Terminologies

- Random experiment
  - → An exp where outcome cannot be predicted with certainity.
- Sample space
  - → Possible set of outcomes.
- Event
  - → Outcome that actually happened.

(iv) Types of events

- Disjoint ○○ → king or Queen (cards)
- Non-disjoint ◎ → noball + six (Cricket)

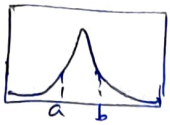
(vi) Types of distribution

- Probability Density function (Pdf)
- Normal distribution
- Central Limit theorem.

→ Probability Density Function.

→ An equation describing continuous probability distribution

→ Bell curve graph.



→ Has 3 properties / → Graph of pdf is continuous.
→ Area bounded by pdf and x-axis = 1
→ P(E) = area b/n a & b. i.e it depends on a & b.

∴ Probability of finding a cont random var b/n a & b.

→ Normal distribution (optional).

→ Depends of mean & std dev.

→ Mean determines where center of graph will be.

→ Std dev determines what the height will be.

→ Also a bell curve.

∴ Main idea is data around mean describes population more than data away from it.

→ Central limit theorem (optional)

→ Sampling distribution of mean of any independent, random variable will be normal (or) nearly normal, if sample size is large enough.

---

*

(vii) Types of Probability

- Marginal.
- Joint.
- Conditional.

Marginal Probability

⇒ Probability of occurence of single event.

Eg:- Card drawn is heart or not? 13/52

Joint Probability

⇒ Probability of 2 events happening at the same time.

Eg:- P(A & B) : Intersection of a & b.

⇒ P(Card is heart && a 4) ⇒ 1/52

Conditional Probability

⇒ CP of event B is prob that it will occur given that A has already occured.

$$P(B|A) = \frac{P(A \cap B)}{P(A)}$$ → '∩' means A and B } if A & B are dependent

$$P(B|A) = P(B)$$ → If A & B are independent.

(viii) Bayes theorem

⇒ Mainly used in naive bayes algo (a supervised algo)
⇒ Used in Gmail Spam.

⇒ Shows relation b/n one conditional prob & its inverse.

$$P(A|B) = \frac{P(B|A) * P(A)}{P(B)}$$