



**Trinity College for Women**  
**Namakkal**  
**Department of Mathematics**

**Advanced Business Statistics**  
**19PCM07 - EVEN SEMESTER**

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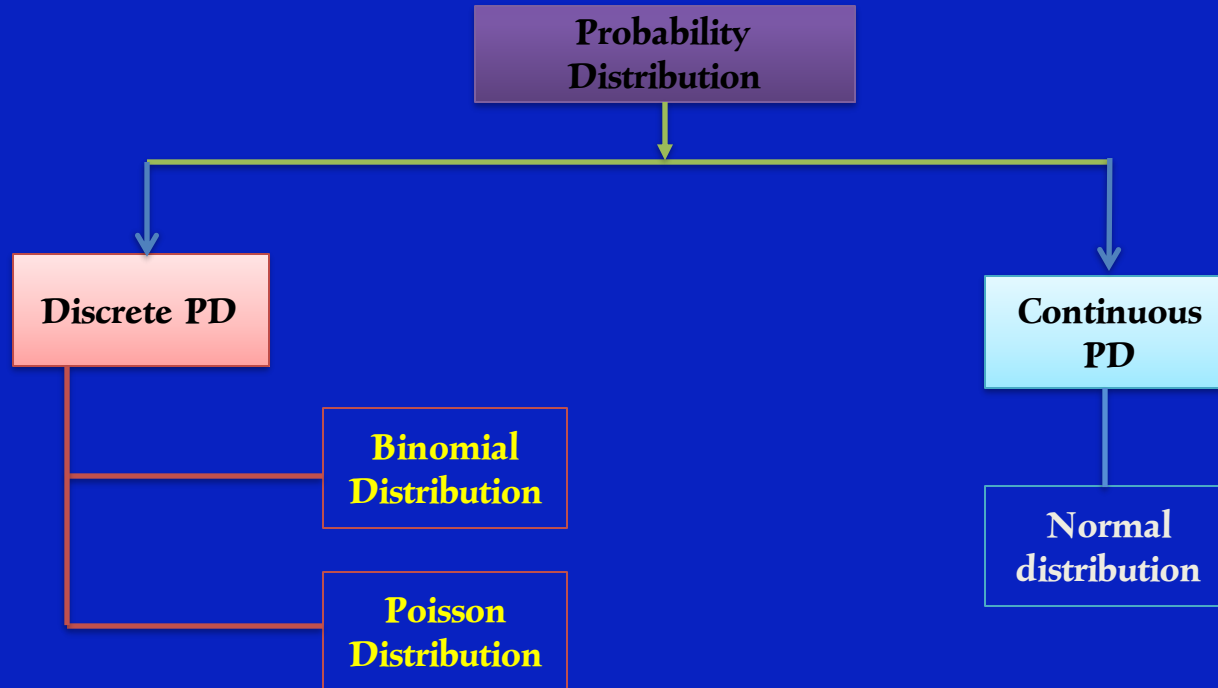
# DISTRIBUTION

- ▶ **Frequency Distribution:** It is a listing of observed / actual frequencies of all the outcomes of an experiment that actually occurred when experiment was done.
- ▶ **Probability Distribution:** It is a listing of the probabilities of all the possible outcomes that could occur if the experiment was done.

It can be describe as:

- \* A diagram (Probability Tree)
- \* A table
- \* A mathematical formula

# Types of Probability Distribution

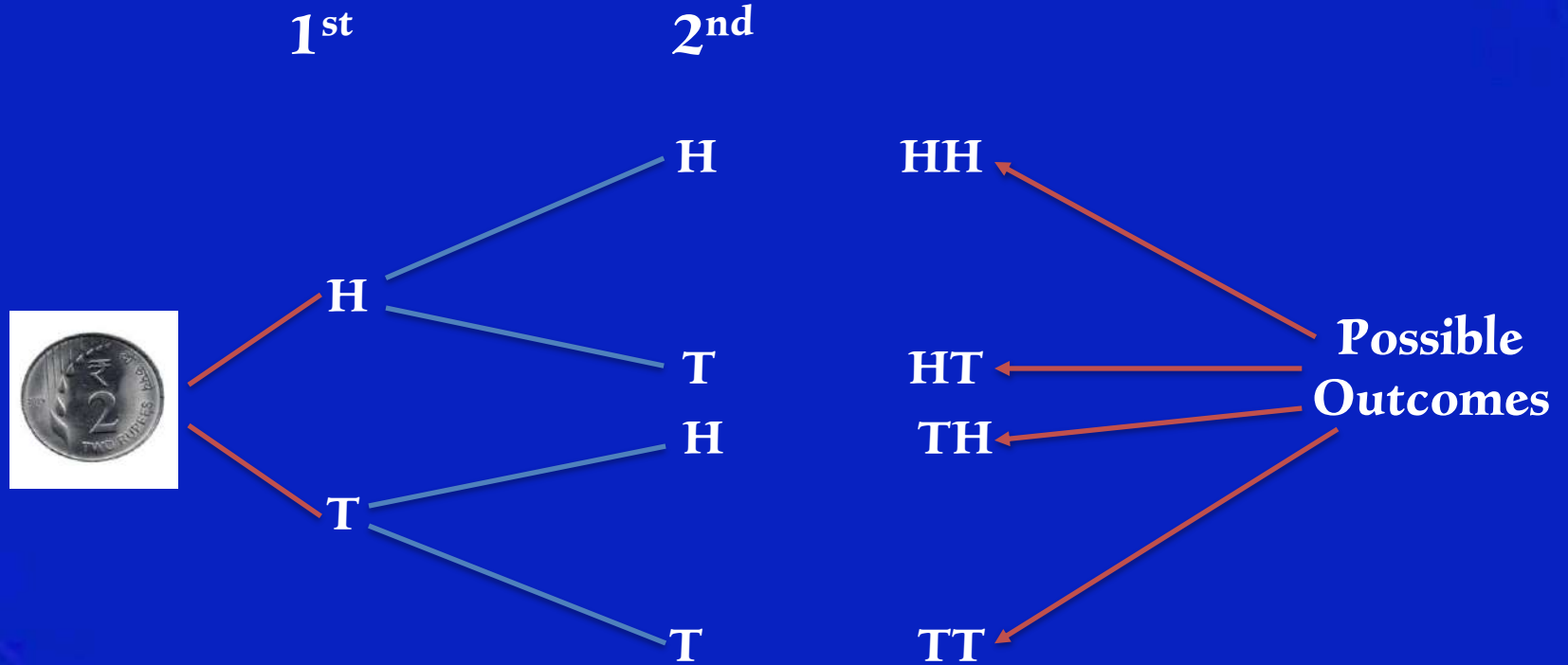


# Probability Distribution

- ▶ **Discrete Distribution:** Random variable can be take only limited number of values. Example: number of heads in two tosses.
- ▶ **Continuous Distribution:** Random Variable can take any value. Example: Height of students in the class.

# TREE DIAGRAM

A Fair Coin is Tossed Twice



# Binomial Distribution

- ▶ There are are certain phenomena in nature which can be identified as Bernoulli's process in which:
  - ✓ There is a fixed number of  $n$  trials carried out.
  - ✓ Each trial has only two possible outcomes say success or failure, true or false etc.
  - ✓ Probability of occurrence of any outcome remains same over successive trials.
  - ✓ Trials are statistically independent.
- ▶ Binomial Distribution is a discrete PT which expresses the probability of one set of alternatives success ( $p$ ) and failure ( $q$ )

$$\bullet P(X=x) = {}^n C_r p^r (q)^{n-r}$$

\*  $n$  = no. of trials undertaken

\*  $r$  = no. of successes desired

\*  $p$  = probability of success

\*  $q$  = probability of failure

# Characteristic of Binomial Distribution

- ▶ The number of trials 'n' is finite.
- ▶ The trials are independent of each other.
- ▶ Success probability 'p' is constant for each trial.
- ▶ Each trial has only one of the two possible results either success or failure.
- ▶ Mean of Binomial Distribution:  $\mu = np$
- ▶ Standard Deviation of Binomial Distribution:  $\sigma = \sqrt{npq}$

# Poisson distribution

- ▶ When there is a large number of trials, but a small probability of success, binomial calculation becomes impractical
- ▶ If  $\lambda =$  mean number of occurrences of an event per unit interval of time/space then probability that it will occur exactly 'X' is given by

$$P(x) = \frac{e^{-\lambda} \lambda^x}{x!} \quad \text{Where } e \text{ is napier constant } \& e = 2.7182$$

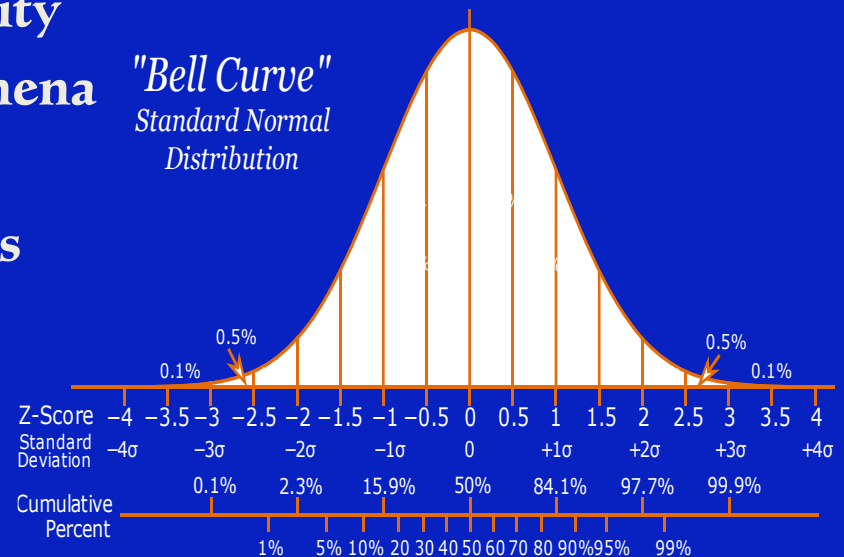


# Characteristic of Poisson Distribution

- ▶ It is a discrete distribution
- ▶ Occurrence are statistical independent
- ▶ Mean number of occurrence in unit of time as proportional to size of unit ( If 5 in 1 year, 10 into year, etc.)
- ▶ Mean of poisson distribution is  $\lambda = np$
- ▶ Standard deviation of poission distribution is  $\sqrt{\lambda} = \sqrt{np}$
- ▶ It is always right skewed
- ▶ Poisson distribution is a good approximate to binomial Distribution when  $n > \text{or} = 20$  and  $p < \text{or} = 0.05$

# Normal Distribution

- ▶ Normal distribution is a probability distribution that is symmetric about the mean, showing that data never the mean for more frequent in occurrence than data far from the mean. In graph form, normal distribution will appear as a bell curve.
- ▶ A normal distribution is a probability distribution used to model phenomena that have a default behaviour and cumulative possible deviations from that behaviour.



# Characteristic of Normal Distribution

- ▶ Random variable can take on any value within a given range. Ex: height, weight, marks, etc.
- ▶ Developed by 18<sup>th</sup> century mathematician- astronomer Karl Gauss, so also called Gaussian distribution.
- ▶ It is Symmetrical, unimodel (one peak).
- ▶ Since it is symmetrical, it is mean, median and mode all coincides i.e. all three are same.
- ▶ The tails are asymptotic to horizontal axis i.e. Curve goes to infinity without touching horizontal axis.
- ▶ X axis represents random variable like height, weight, etc
- ▶ Y axis represents it's probability density function.
- ▶ Area under the curve tells the probability.
- ▶ The total area under the curve is 1 (or 100 %)
- ▶ Mean=  $\mu$ , Standard deviation =  $\sigma$

THANK YOU

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