COMPOUND PROBABILITY

TEAM 21

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COMPOUND PROBABILITY

- **Compound probability** can be defined as the probability of two or more independent events both happening.
- **Independent events** are events in which outcome of one event has no effect in outcome of another event.
- The equation for compound probability looks like this:

$$P(A \cap B) = P(A) * P(B)$$

SET THEORY

- A set is well-defined as a collection of objects.
- If an event contains more than one sample point, it is termed as compound event.
- We represent compound events using sets.
- Venn-Euler diagrams are used for representation of Sets.
- For example, we can represent the event "getting atleast one tail " when two coins are tossed as {TT,HT,TH}.

$$P(event) = 3/4$$

- Sets are used to represent a particular event occured with some condition.
- So it is important to be familiar with algebra of sets.
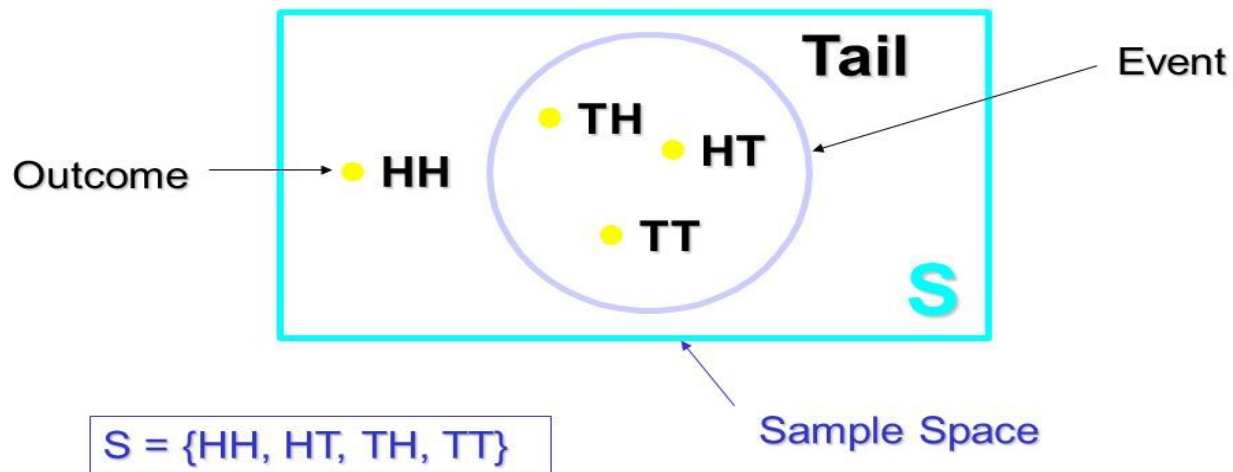
COUNTING

- Counting means determining all the possible ways the elements of a set can be arranged.
- In the context of probability, to decide "how likely" an event occurs we need to count the number of times an event can occur and compare it with total number of possible events.
- Counting mainly encompasses fundamental counting rule, Permutation rule and combination rule.
- Permutation refers to an ordered arrangement of elements of a set. The number of permutations are the all such ordered arrangements possible.
- Combination refers to an unordered arrangement of elements in a set. In a combination order of elements doesn't matter.
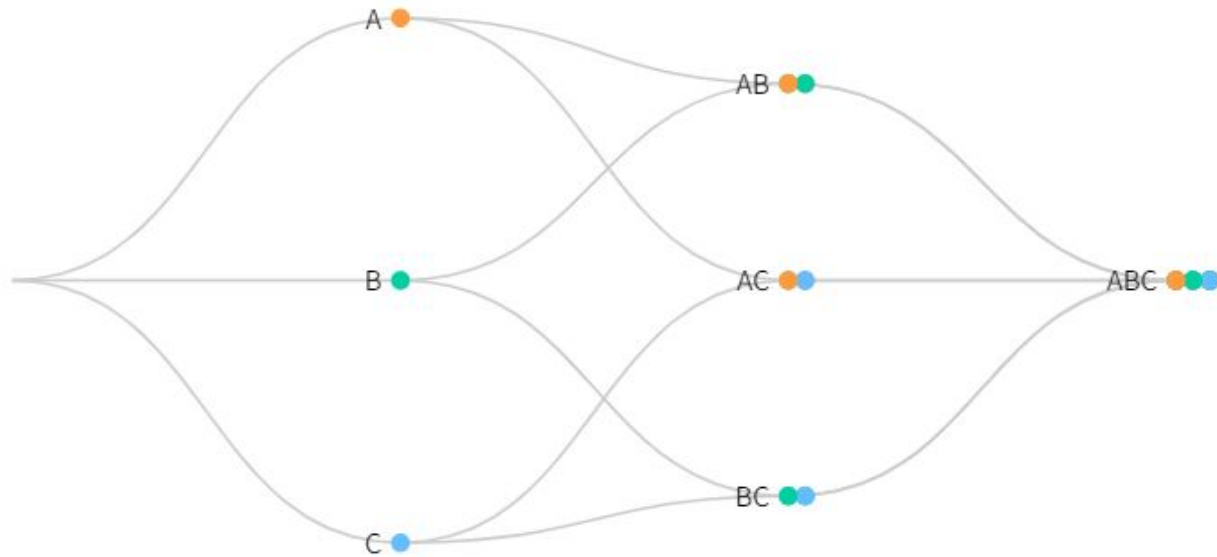
Example:

Consider a bag of three balls in which each ball of three different colours(A,B,C).If we draw balls one at a time from the bag without replacement, the possible ordered sequences(permutations) and unordered sets(combinations) are

No. of possible

permutations are
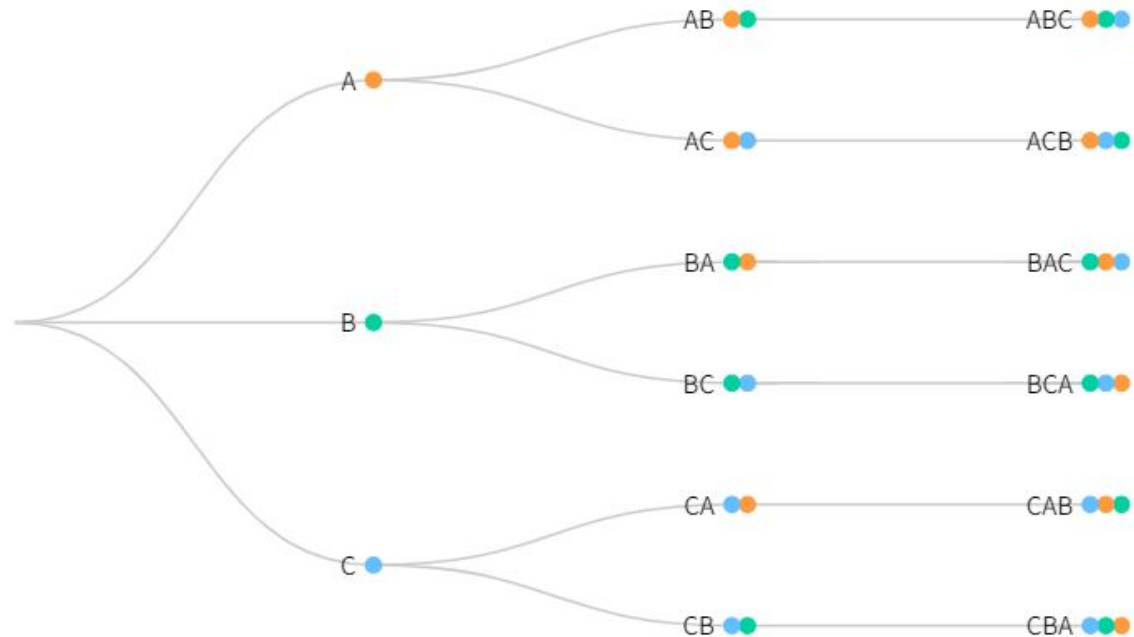
No. of possible combinations are:

CONDITIONAL PROBABILITY

- Conditional probability is the probability of a event occurring with some relationship to one or more events.
- Conditional probability of an event B is the probability of the event will occur given the knowledge that an event A has already occurred.
- It is denoted by P(B|A).

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

- For example, the probability that it will rain tomorrow will be less than the probability that it will rain tomorrow given that it is cloudy today.

Example:
The Probability of an event A is getting two heads when an event B is given that atleast one head has occurred, when two coins are tossed.

Given that,

Sample space (S)= {HH,HT,TH,TT}

A = {HH}

B = {HT,TH,HH}

$$P(A|B) = \frac{P(B \cap A)}{P(B)} \quad = \quad \frac{\frac{1}{4}}{\frac{3}{4}} \quad = \quad \frac{1}{3}$$