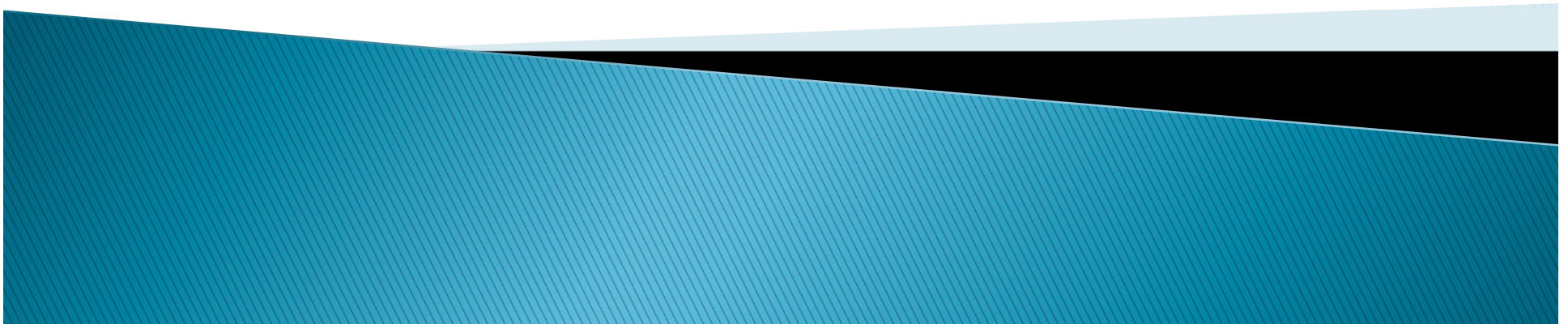
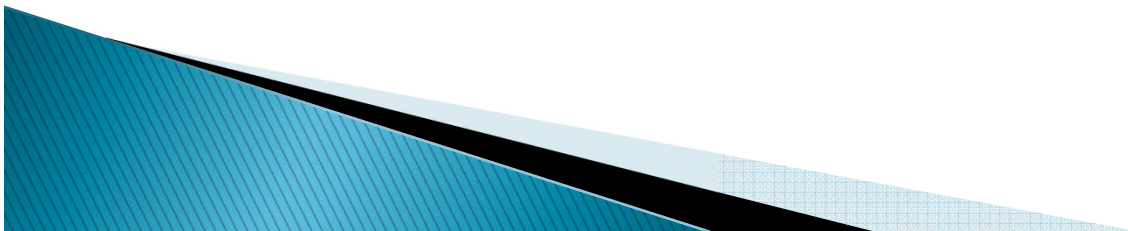


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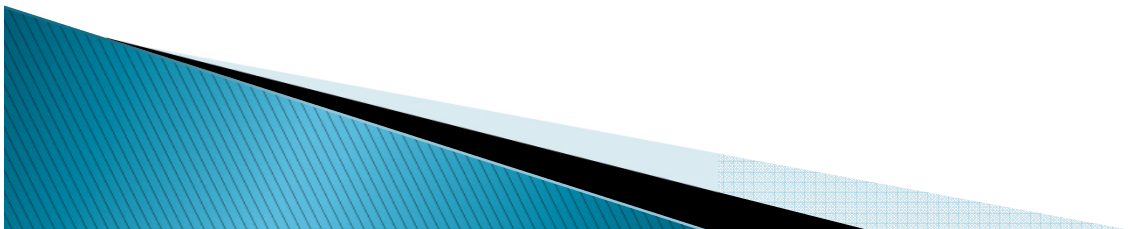


Quantitative Methods in Business

Unit -1 : Probability



- ▶ A probability is a number that reflects the chance or likelihood that a particular event will occur.
- ▶ Probability is the extent to which an event is likely to occur, measured by the ratio of the favourable cases to the whole number of cases possible.
- ▶ Probability theory, a branch of mathematics concerned with the analysis of random phenomena. The outcome of a random event cannot be determined before it occurs, but it may be any one of several possible outcomes. The actual outcome is considered to be determined by chance.



Simple Probability

$$\text{Probability} = \frac{\text{Favorable outcomes}}{\text{Total outcomes}}$$



Example:

$$P(\text{red}) = \frac{7}{12}$$

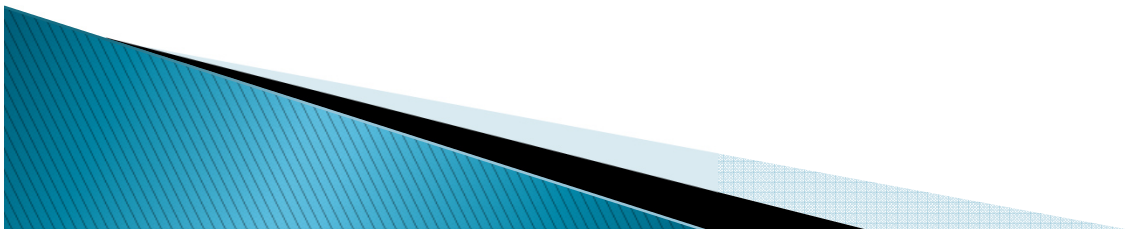
← Number of red marbles
← Total number of marbles (sample space)

$$P(\text{blue}) = \frac{5}{12}$$

← Number of blue marbles
← Total number of marbles (sample space)

Basic Concepts in Probability

- ▶ **Random Experiment-** A random experiment is an experiment or a process for which the outcome cannot be predicted with certainty.
- ▶ An operation which can produce some well-defined outcomes, is called an **experiment**. Each outcome is called an event. An **experiment** in which all possible outcomes are known and the exact outcome cannot be predicted in advance, is called a **random experiment**.



- ▶ **Sample space** - The sample space (denoted S) of a random experiment is the set of all possible outcomes.

Sample Space

A **sample space** is the set of all possible outcomes in an experiment.

Example:

Two coins are tossed. Represent the sample space for this experiment by making a list, a table, and a tree diagram.

(H – Head, T – Tail)

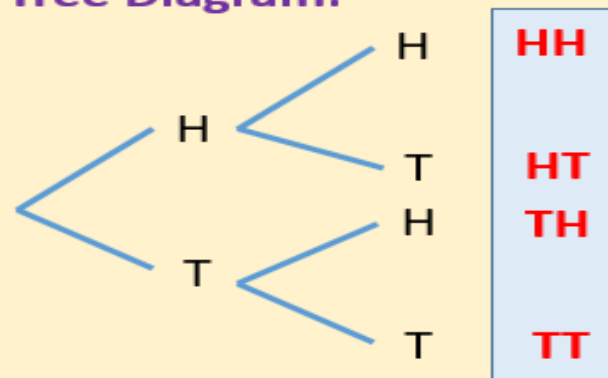
List:

HH HT TH TT

Table:

	H	T
H	HH	HT
T	TH	TT

Tree Diagram:



The sample space is $\{HH, HT, TH, TT\}$

- ▶ **Exhaustive Events** – All Possible outcomes of an experiment are called exhaustive events
- ▶ **Favourable Events** – The number of cases favourable to an event in a trail is the number of outcomes which entail the happening of the event.

Example:

In Drawing a Card from a deck of cards, the number of favorable cases in getting a spade is 13.

- ▶ **Equally likely events** – Two or more events are equally likely if each of them has an equal chance of happening.
- ▶ **Mutually Exclusive Events** – Two events are said to be mutually exclusive if the occurrence of any one of them excludes the occurrence of the other in a single experiment.

Example:

If a coin is tossed, the events Head(H) and Tail(T) are Mutually Exclusive



- ▶ **Independent Events** – Two or more events are independent if the occurrence of one does not affect the occurrence of the other.

Example:

If a Coin is thrown twice, the result of the second throw is not affected by the result of the first throw.

- ▶ **Dependent Events** – Two events are said to be dependent if the occurrence or non- occurrence of an event in a trial affects the occurrence of the other event in other trials.

Example:

If we draw 2 cards one after other a pack, we draw one card out of 52 cards in the first case. In the second case we draw one card out of 51 cards. Thus the two events are dependent.

- ▶ **Complementary Events** – If A and B are mutually exclusive and Exhaustive events, then A is the complementary event of B and vice versa.

Example:

When a die is thrown, occurrence of an even number and occurrence of an odd number are complementary Events.

