

"Probability"

"Basics of Probability"

Probability \rightarrow chances

Possible chance \rightarrow 0% to 100%.

$$\left(\frac{0}{100} \text{ to } \frac{100}{100} \right)$$
$$(0 \text{ to } 1)$$

Random experiment:

An experiment which produces different results even though it is repeated a large number of times under essentially similar conditions, is called a random experiment.

A random experiment has three properties:

- i) Repeated any number of times.
- ii) Two or more possible outcomes.
- iii) Repeated outcomes are unpredictable.

trial:

A single performance of an experiment is called a trial.

Outcome:

Results obtained from an experiment or a trial is called an outcome.

Sample Space:

A set consisting of all possible outcomes that can result from a random experiment is defined to be a sample space and is denoted by S . For example:

$$S = \{1, 2, 3, 4, 5, 6\} \quad \# \text{ roll a single dice}$$

$$S = \{\text{names of all cities of Pakistan}\}$$

Events:

An event is an individual outcome or any number of outcomes (sample points) of a random experiment.

"Axioms of Events"

- i) Mutually Exclusive Events.
- ii) Exhaustive Events.
- iii) Equally likely events.

Revision (Sets)

$$U = \{1, 2, 3, 4, \dots, 20\}$$

$$A = \{1, 2, 3, 5, 7, 10, 11\}$$

$$B = \{2, 5, 6, 8, 9, 10, 13\}$$

$$C = \{4\}$$

$$\therefore A \cap B = \{2, 5, 10\}$$

Common numbers

$$A \cup B = \{1, 2, 3, 5, 6, 8, 7, 9, 10, 11, 13\}$$

all the elements of A, all the elements of B and repeated numbers just once.

$$A \cap B = \{ \}$$

empty set

$$A^c = U - A = \{4, 6, 8, 9, 12, 13, \dots, 20\}$$

all the elements of universal set, which are not in A.

$$B - A = \{2, 6, 8, 9, 13\}$$

elements of B which are not in A.

i) Mutually Exclusive Events:

Two events A and B of a single experiment are said to be mutually exclusive or **disjoint** if and only if they can't both occur at the same time. That is they have no common point. Similarly for two or more events.

$$A \cap B = \{\}$$

$$P(A \cap B) = 0.$$

$$A_1 \cap A_2 \cap \dots \cap A_k = \{\}$$

↓
K mutually exclusive events.

ii) Exhaustive Events:

Events are said to be collectively exhaustive, when the union of mutually exclusive events is the entire sample space S.

$$\text{i.e.; } A \cup B = S$$

$$A_1 \cup A_2 \cup \dots \cup A_k = S$$

↳ K exhaustive events

$$P(A \cup B) = 1$$

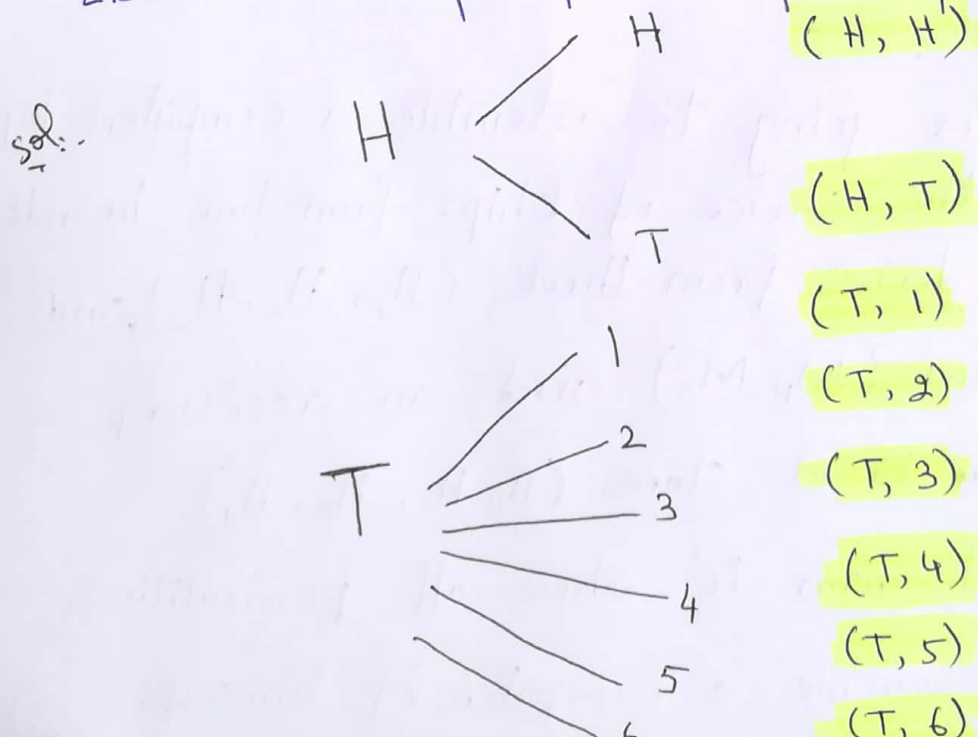
iii) Equally Likely Events:

Two events A and B are said to be equally likely, when one event is as likely to occur as the other.

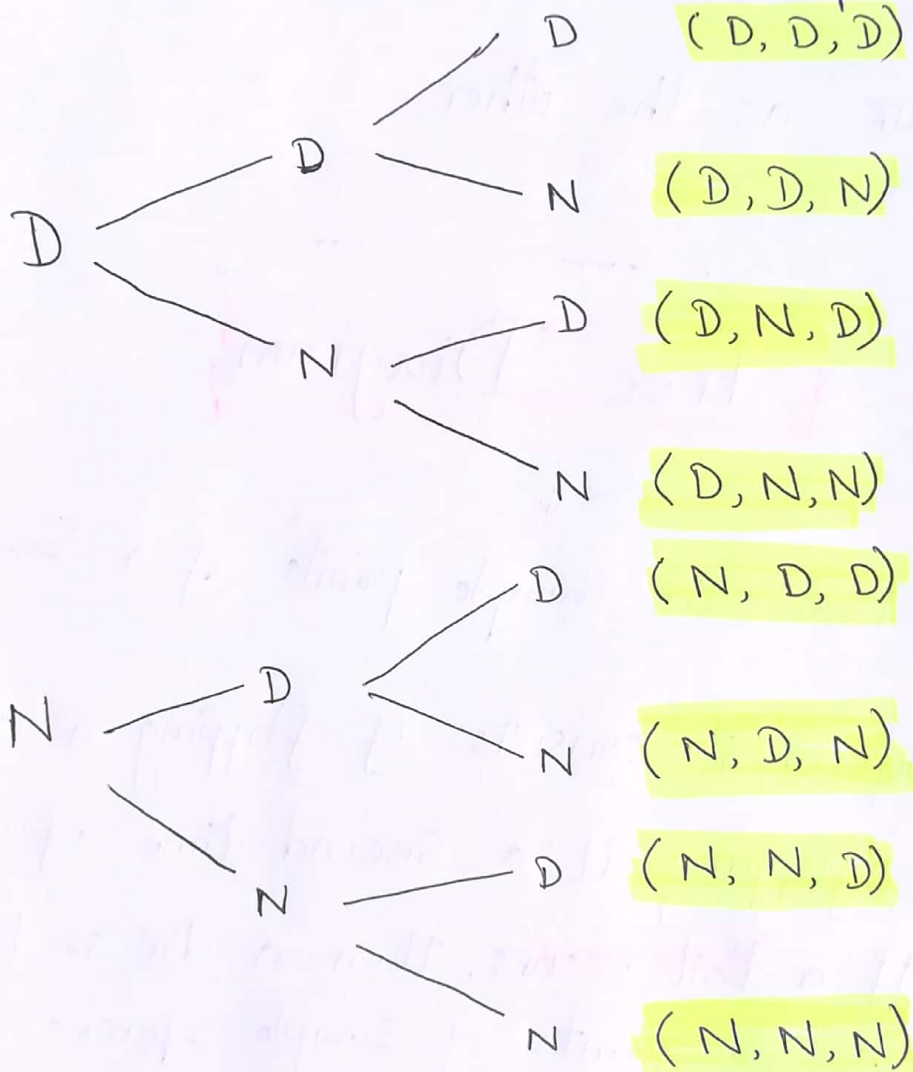
Tree Diagram

to know the Sample points of a Sample Space.

Q-1:- An experiment consists of flipping a coin and then flipping it a second time if a head occurs. If a tail occurs, then a die is tossed. List the sample points of Sample Space.



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