7 Dec 2022 Unit - 1

probability

* Random Experiments, sample space, events, types of events & operations on events.

* Random experiments -
- A Random experiment is a process by which we observe someting uncertain & outcome is the result of random experiment.
The set of all posible outcomes is called a sample space
thus the In context of random sample space is a universal set.
- Few eg: of random experiment gives as follow

① tossing a coin.
$S = \{H, T\}$

② Rolling a die
$S = \{1, 2, 3, 4, 5, 6\}$

- The No. of iphones ~~Stolled~~ Soled by the Apple Stored In ~~2015~~ 2015

* ~~Trial~~ Trial
- If random experiment is repeated several time we called each one of them is trial.

- It's a particular perform of random experident
eg:-
A coin is toss ~~three~~ 3 times.

$S = \{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$

Assing probability to certain event.
- A probability of getting outcome of Rolling a die is an even No. then the event is

$S = \{1, 2, 3, 4, 5, 6\}$

$E = \{2, 4, 6\}$

$P(E) = \frac{1}{2} = 0.5$

An event is the collection of possible outcomes it is a subset of sample space to which we assign probability as the review of all.

① outcome - result of random experiment
② sample space - set of all possible outcome
③ event - is a subset of sample space.

* Types of events -
① independent event - eg - toss the coin 3 times
- independent events are those in which next outcome is independent of the privious outcome that means probability of occurrence of the event's will remain same. No matter how many times same experiment is done.

For eg: -
① A die is rolled once & probability of getting an even No. is 1/2, I now a die is rolled again, still the probability of getting even No is 1/2.
hence probability of a event is independent on privious outcome. such event is called independent event.

② dependent event -

- dependent events are those in which next outcome depends on the previous outcome that means the probability of event is change on it's previous outcome.

eg:- (plouPul

drawing ball's from bag -

4 - Black Ball

3 - red

An a ball is draw an random ang getting outcome of black ball 4 outEo P 7

- And th when the event Perform again the probability of black ball will change because know there are few ball left from bag (3 black & 3 red) are left

So; know the probability of getting black ball again is 3 outof 6.

* - simple event -

- any event that comprises a single result from the sample space is known as simple event.

eg:- Rolling a die

$S = \{1, 2, 3, 4, 5, 6\}$

and event of getting a outcome is <2 is

$E = \{1\}$

E has a single result from the sample space. & hence event E is simple event.

compound
(4) * Compont event :-
- A compound event is just opposite to simple event it comprises of more than single event from sample space such event is known as compound event.
eg:- For a sample space $S = \{1,2,3,4,5,6\}$ & event $E = \{3,4,5\}$ the E is compound event.

(5) *** mutualy mostly exclusive event :-
- have noting is common it is similar to mutualy exclusive set.
for eg:- sample space is $S = \{22,25,27,29,31\}$
$E_1 = \{23,25,27\}$ $E_2 = \{29,31\}$
$n(E_1 \& E_2)$

=# Note:- Union of mutualy exclusive events gives a sample space.

• * operations on events
(1) AND (Intersection (∩))
(2) OR (union (∪))

- AND event is obtained by 2 or more than 2 events by operating intersection between 2 events
for eg:- $E_1 = \{2,3,4,5\}$
$E_2 = \{3,4,5,7,8\}$
$E_1 \cap E_2 = \{3,4\}$
AND

- OR event obtained by operating Union between the 2 events
for eg:- $E_1 = \{2,3,4,5\}$ $E_2 = \{3,4,5,6\}$

$E_1 \cup E_2 = \{2, 3, 4, 5, 6\}$
OR

(3) ✱ Complementary event
- A Complementary is defn as the event which has the rest of elements present in the sample space other than the event is given.
For eg:-

$S = \{1, 2, 3, 4, 5, 6\}$
$E = \{1, 2, 3\}$ $E' = \{4, 5, 6\}$

Q.Ex1) A die is rolled in which E_1 is event of getting even No. & E_2 is event of getting a No. more than 3 find AND, OR, event for both.

→ Sample space $S = \{1, 2, 3, 4, 5, 6\}$
$E_1 = \{2, 4, 6\}$
$E_2 = \{4, 5, 6\}$
AND $(E_1 \cap E_2) = \{4, 6\}$
OR $(E_1 \cup E_2) = \{2, 4, 5, 6\}$

Ex-2 A die is rolled an E_1 is event of geeting a No. less than 5, E_2 is event of getting a No. more than 2, find the following events
(1) E_1 but not E_2 $E_1 - E_2$
(2) E_2 but not E_1 $E_2 - E_1$

Ex-3 Write the sample space for tossing 3 to coins at once & also find the event of exactly 2 heads at a time & find it's probability.

Ex-4 Names the types of events obtained from following experiments

① A coin is tossed for 5 times & event of getting a tail when the first 4th times the getting result was head.

② Sample space $S = \{1,2,3,4,5\}$ & event $E = \{4\}$

③ $S = \{1,2,3,4,5\}$ & event $E = \{2,4\}$

④ $S = \{1,2,3,4,5\}$ $E_1 = \{1,2\}$, $E_2 = \{3,4\}$

5 The sample space of an experiment is $S = \{10, 11, 12, 14, 15, 16, 17\}$ & event E is all the even No. what will be the complement of event E.

If we roll a die A is event of getting even No B is event of getting No. less than 3, & C is event of getting 1st & last No. Find the following events.

① $A \cup B$
② $A \cap B$.
③ $(A \cap B) \cup C$
④ B'
⑤ $(A \cup B) \cap C$
⑥ $A \cap B \cap C$.