Statistics :- II

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Assignment - 1

Q. Define

a) Non-deterministic Experiment :-

- If an experiment is repeated under essensially homologous and similar conditions then the experiment helps in predicting the outcome of the experiment but not with complete reliability.
- There are more then one possible outcomes and we are not sure exactly which of these is going to turn up
- eg:- A coin is tossed repeatedly until a head is obtained.

b) Sure event :-

- A sure event is an event, which always happens.

eg:- It's sure event to obtain a number between 1 and 6 when rolling an ordinary die.

- The probability of an impossible event has the value of '0'

d) Imposible Event :-
An event which does not contain any sample ~~p~~ point is called as impossible even.
i.e. event corresponding to null or empty set.
- ex:- In tossing of a die, the event A that the number of points on the upper face is 7 is impossible i.e. $A = \phi$

e) Exhaustive Event :-
The total number of possible outcomes of a random experiment are known as exhaustive ~~ex~~ events.
$A_1, A_2, \ldots A_n$ defined on Ω are said to be exhaustive if $A_1 \cup A_2 \cdots \cup A_n = \Omega$
ex:-
if $\Omega = \{0,1,2,3,4,5,6,7,8,9\}$
If $A_1 = \{0,2\}$, $A_2 = \{5,9\}$, $A_3 = \{9\}$
$A_4 = \{1,3,4,6,7,8\}$
$A_1 \cup A_2 \cup A_3 \cup A_4 = \Omega$
$\therefore A_1, A_2, A_3$ and A_4 are exhaustive.

e) Sample Space :-
The set of all possible distinct outcomes of an experiment is called as "sample space", It is ~~define~~ denoted by Ω or S.

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state axioms of probability. Also prove that "for any event A defined on Ω, $0 <= P(A) <= 1$"

let Ω be a sample space concerning a random experiment. Let A be any event of Ω probability of A, denoted by P(A) is, defined as any real value function of Ω which satisfies the following axioms

Axiom 1 : $P(A) \geq 0$

Axiom 2 : $P(\Omega) = 1$

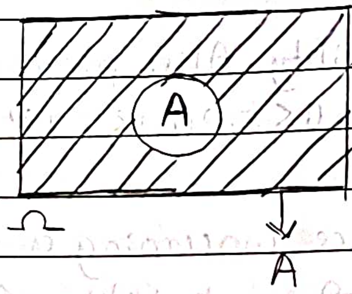
Axiom 3 : If $A_1, A_2, \ldots A_n$ are any mutually exclusive events of Ω, then

$$P\left[\bigcup_{i=1}^{n} A_i\right] = \sum_{i=1}^{n} P(A_i)$$

In particular, if A and B are two mutually exclusive (disjoint) events, then
$P(A \cup B) = P(A) + P(B)$

Write note on :-

complement of an Event :-
If A is an event on Ω then complement of A is the event corresponding to the set A. In orther which words A is the event containing all points in Ω which are not in A.
eg:- If in the experiment of rolling a die. A = occu of an event number, then complement of event A is A = occurence of an odd number.



b) Intersection of two or more event :-

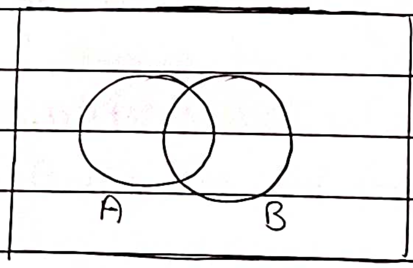
→ let A and B be the two events defined on sample space Ω. The intersection of A and B denoted by $A \cap B$ is the event which contains all points, which are in A and B both.

i.e. $A \cap B = \{x, \mid x \in A \text{ and } x \in B\}$

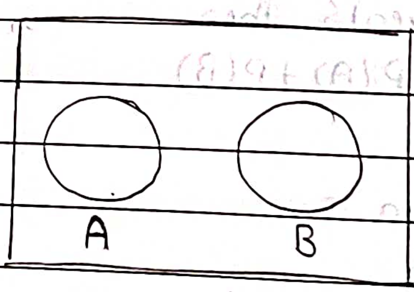
for ex :- $\Omega = \{1,2,3,4,5,6,7,8\}$

let $A = \{1,2,4,6\}$, $B = \{2,4,6,8\}$

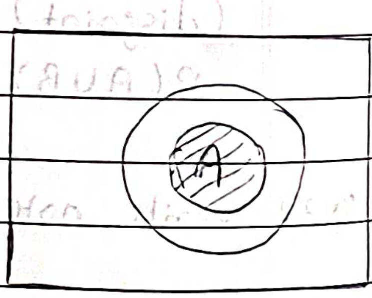
Then, $A \cap B = \{2,4,6\}$.



$A \cap B$ - shaded



$A \cap B = \phi$



$A \cap B = A$ - shaded.

Remarks :- 1) $A \cap B = B \cap A$

2) $A \cap \phi = \phi$

3) $A \cap A' = \phi$

4) $A \cap \Omega = A$

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c) Non-Deterministic Experiment :-
If an experiment is repeated under essencially homologous and similor condition's then the experiment helps in predicting the outcomes of the experiment but not with complete relability. There are more than 1 possible outcomes and we are not sure exactly which of these is going to turn up. In such kind of experiments chanse foctor plays a prominent role Therefore they are called random or parabilistic experiment.

d) Infinite sample space :-
If the number of sample points for an experiment not finite i.e. there is no ~~up~~ upper limit on the elements combined in sample space then it is called as infinite sample.
It can be further classified as :-
i) Countably infinite sample space.
ii) Uncountable infinite sample space.

Q.4) Explain concept of probability of an event. Also state the axioms of probability.
→ Probability of given event is expression of liklihoud chanse of occurance of an event. It is a number ranging from 0 to 1. If it is equal to zero then it is equal to 1 it indicates event is sure to occur And depending upon the value it takes ~~at~~ we can about the degree of certaining of its occurances.

Axions of probability :-

Axiom 1 - P(A) is a real no. such that, $P(A) \geq 0$ for any event

Axiom 2 - $P(\Omega) = 1$

Axiom 3 - $P(A \cup B) = P(A) + P(B)$ for every pair of mutually exclusive events defined on Ω

Q.5) State classical defination of probability. Also state its limitations.

→ If a random experiment results into n mutually exclusive, exhaustive and equally likely events out of which m are favourable to the event A then probability of occurance of the event A is denote by P(A) and is given by $P(A) = m/n$.

Thus,

$$P(A) = \frac{\text{Number of elements belonging to A}}{\text{Total number of elements in the sample space}}$$

$0 \leq m \leq m$

limitations of classical probability :-

1) If the various outcomes, of the random experiment are not equally likely.

2) If is the number of exhaustive, outcomes is not finite then this defination cannot be applied.

3) If the actual value of N - total number of outcomes for the experiment is not known, then application of this defination fails.