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SUBJECT – STATISTICS

B.SC. PART-I SEMISTER- I

STATISTICS PAPER – II

TOPIC NAME : POISSON DISTRIBUTION

What is Probability

- Probability is the chance ofthat something will happen - how likely it is that some event will happen.

- Example:

  1) It sis unlikely to rain tomorrow.

  2) Probability that occures head when one coin is toosed.

- **Exhaustive Events:**

  The total number of all possible elementary outcomes in a random experiment is known as exhaustive events.

  In other words, a set is said to be exhaustive, when no other possibilities exists.

- **Favorable Events:**

  The elementary outcomes which favor the happening of an event is called as favorable events. i.e the outcomes which help in the occurrence of that event.

Mutually Exclusive Events:

The events are said to be mutually exclusive if the occurrence of an event totally prevents occurrence of all other events in a trial.

In other words, two events A and B cannot occur simultaneously.

Priori or Mathematical Definition of Probability:

- Suppose A be any event the probability that getting event A is ratio of no. of favourable event (m) to total no. of exhaustive event.

$$P(A) = \frac{\text{Total no. of elements in Set A}}{\text{Total no. of elemets in a sample space}}$$

$$= \frac{n(A)}{n(S)}$$

Also,

Probability Formula

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$$P(A) = \frac{\text{Number of favorable outcomes to A}}{\text{Total number of possible outcomes}}$$

Axiomatic Approach

- This approach was proposed by Russian Mathematician A.N . Kolmogorov in 1933.
- 'Axioms' are statements which are reasonably true and are accepted as such without seeking any proof.
- Definition:

  Let S be the sample space associated with a random experiment. Let A be any event S, then P(A) is the probability of occurance of A if the following axioms are satisfied.

  1)P(A) > 0, where bA is an event.

  2)P(S) = 1

  3)P(AUB) = P(A) + P(B), when event A and B are mutually exclusive.

Solved Examples

Example 1:

Find the probability of getting a number less than 5 when a dice is rolled by using the probability formula.

Solution

To find:

Probability of getting a number less than 5
Given: Sample space = {1,2,3,4,5,6}
Getting a number less than 5 = {1,2,3,4}
Therefore, n(S) = 6
n(A) = 4
Using Probability Formula,
P(A) = (n(A))/(n(s))
p(A) = 4/6
m = 2/3

Answer: The probability of getting a number less than 5 is 2/3.

Example 2:

What is the probability of getting a sum of 9 when two dice are thrown?

Solution:

There is a total of 36 possibilities when we throw two dice.
To get the desired outcome i.e., 9, we can have the following favorable outcomes. (4,5),(5,4),(6,3)(3,6). There are 4 favorable outcomes.
Probability of an event P(E) = (Number of favorable outcomes) ÷ (Total outcomes in a sample space)
Probability of getting number 9 = 4 ÷ 36 = 1/9

Answer: Therefore the probability of getting a sum of 9 is 1/9.

Example 3:

Find probability of head and tail when one coin is tossed

Solution:

A single coin on tossing has two outcomes, a head, and a tail. The concept of probability which is the ratio of favorable outcomes to the total number of outcomes can be used to find the probability of getting the head and the probability of getting a tail.

Total number of possible outcomes = 2; Sample Space = {H, T}; H: Head, T: Tail

P(H) = Number of heads/Total outcomes = ½

P(T)= Number of Tails/ Total outcomes = 1/2

Example 4 :

Find the probability of even no., odd no. and prime no. when one die is tossed.

Solution:

The total number of outcomes on rolling a die is 6, and the sample space is {1, 2, 3, 4, 5, 6}. Here we shall compute the following few probabilities to help in better understanding the concept of probability on rolling one dice.

P(Even Number) = Number of even number outcomes/Total Outcomes = 3/6 = ½

P(Odd Number) = Number of odd number outcomes/Total Outcomes = 3/6 = 1/2

P(Prime Number) = Number of prime number outcomes/Total Outcomes = 3/6 = 1/2

THANK YOU