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Course Name : Data analytics with GenAi

Topic : Probability Basics

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Question1 A die is rolled. What is the probability of getting: (a) An even number (b) A number greater than 4
Answer

Dies total outcome = {1,2,3,4,5,6}

Total outcome=6

a)even number {2,4,6}

p(even)=3/6

½

b)number greater than 4

Favourable outcome =2

p(number>4)=2/6

Answer ⅓

Question2 In a class of 50 students: 20 like Mathematics (M) 15 like Science (S) 5 like both subjects What is the probability that a student chosen at random likes Mathematics or Science?

Answer probability assignment2.xlsx

Question3 A bag has 3 red and 2 blue balls. If one ball is drawn randomly and is red, what is the probability that the next ball is also red (without replacement)?
Answer probability assignment2.xlsx

Question4 The population of a school is divided into 60% boys and 40% girls. If you want equal representation of both genders in the sample, which method should you use: Simple Random Sampling or Stratified Sampling? Why?

Answer popularity : boys=60% ,Girls 40%
To ensure equal representation of boys 60% and girls 40% we need to sample from each group.
Correct method; stratified sampling because it divides the population into groups (boys/girls)and samples from each group to maintain balance **.**

Question5 The average height of 1000 students = 160 cm. A sample of 100 students shows an average height = 158 cm. Find the sampling error.
Answer probability assignment2.xlsx

Question6 The population mean salary is ₹50,000 with σ = ₹5,000. If we take a sample of 100 employees, what is the standard error of the mean (SEM)?
Answer probability assignment2.xlsx

Question7 In a group of 100 students: 40 like Cricket (C) 30 like Football (F) 10 like both Cricket and Football Find the probability that a student likes at least one sport.
Answer probability assignment2.xlsx

Question8 From a deck of 52 cards, two cards are drawn without replacement. What is the probability that both are Aces?
Answer probability assignment2.xlsx

Question9 A factory produces bulbs with 2% defective rate. If 5 bulbs are chosen at random, what is the probability that all are non-defective?
Answer probability assignment2.xlsx

Question10 Differentiate between discrete and continuous random variables with examples

Discrete Random Variables

- Definition: Can only take on specific, separate, or countable values, often integers, representing counts.
- Nature: Values are distinct and have gaps between them, like steps on a staircase.
- Examples:
  - Number of students in a classroom.
  - Outcome of rolling a die (1, 2, 3, 4, 5, or 6).
  - Number of heads in 10 coin flips.
  - Number of defective items in a batch.
- Probability: Probability is assigned to each specific value (PMF)

Continuous Random Variables

- Definition: Can take any value within a given range or interval, representing measurements.
- Nature: Values are infinite and uncountable, forming a continuous scale.
- Examples:
  - Height or weight of a person (e.g., 165.5 cm, 165.51 cm).
  - Time taken to run a mile.

    - Temperature in a room.
    - Amount of sugar in an orange.
- Probability: Probability is calculated over intervals; the probability of an exact single value is zero