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Assignment:***Probability Basics***

Batch:***Data Analytics Dec Live Batch***

Question 1: A die is rolled. What is the probability of getting:

(a) An even number

(b) A number greater than 4.

Answer: a) If a die is rolled then the probability of getting an even number is (2,4,6) 3/6 or we can say that ½.

b)The probability of getting a number greater than 4 will be (5,6) 2/6 or we can say that 1/3.

Question 2: 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:a)The probability that a student chosen at random likes mathematics science will be:

20+15-5=30

30/50=3/5

The probability of student chosen at random likes mathematics or science is 3/5.

Question 3: 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: The probability of next ball drawn from bag is red will be 2/4 which is ½.

Total ball after 1 red ball drawn will be 4(in total) and 2(in red).

Question 4: 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: **Stratified Sampling** should be used because it ensures equal representation of both boys and girls by sampling separately from each group.

Question 5: The average height of 1000 students = 160 cm. A sample of 100 students shows an average height = 158 cm. Find the sampling error.

Answer: **Sampling Error = Sample Mean – Population Mean**

Sampling error =158-160

Sampling error = **-2 cm**

Question 6: 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: SEM = ₹500

Question 7: 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: 40+30-10=60(WHO LIKES AT LEAST ONE SPORT)

So,60/100=**0.6 OR 60%**

Question 8: From a deck of 52 cards, two cards are drawn without replacement. What is the probability that both are Aces?

Answer:Probability of first was Ace:**4/52**

Probability of second was Ace: **3/51**

So, 4/52*3/51 =**12/2652**

=**1/221**

Question 9: 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 a bulb is **non-defective** = 1−0.02=0.981 - 0.02 = 0.981−0.02=0.98

$P(\text{all non-defective}) = (0.98)^5$

Calculation:

$(0.98)^5 \approx 0.9039$

So, there is about a **90.39%** chance that all 5 bulbs are non-defective.

Question 10: Differentiate between discrete and continuous random variables with examples.

Answer:

Discrete Random Variable	Continuous Random Variable
Takes **countable** values	Takes **uncountable** values
Values are usually **whole numbers**	Values can be **any real number** within a range
Obtained by **counting**	Obtained by **measuring**
Has a **probability mass function (PMF)**	Has a **probability density function (PDF)**
Probability of a specific value **can be non-zero**	Probability of a specific value is **zero**

Examples

- **Discrete**:
  - Number of students in a class
  - Number of heads when tossing coins
  - Number of defective items
- **Continuous**:
  - Height of students
  - Weight of a person
  - Time taken to complete a task