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

(a) An even number

(b) A number greater than 4

Answer: (a) Even numbers on a die = {2, 4, 6}

Total outcomes = 6

P(Even) = 3/6 = ½

(b)   A number greater than 4 = {5, 6}

P (no. greater than 4) = 2/6 = 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: Total students = 50

|M| = 20, |S| = 15, |M ∩ S| = 5

Students who like M or S:

|M∪S|= |M|+|S|−|M∩S| = 20+15-5 = 30

P (M or S) = 30/50 = 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 bag has 3 red and 2 blue balls.

One red is already drawn (without replacement).

Remaining balls = 2 red, 2 blue (Total = 4)

P (Next is Red) = 2/4 = ½

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: We use stratified Sampling because the population has unequal groups (60% boys,40% girls), and stratified sampling ensures equal representation of both genders in the sample by selecting proportionally 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 = Population Mean- Sample Mean = 160-158 = 2cm

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: Population SD (σ) = ₹5,000

Sample size (n) = 100

SEM = SD/ √n = 5000/10 = 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: Total students = 100
$|C| = 40, |F| = 30, |C \cap F| = 10$

|CUF|= 40 + 30 -10 = 60

P (at least one sport)= 60/100 = 0.6

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

Answer: Total cards = 52

Number of Aces = 4

P(First Ace) = 4/52

P(Second Ace) = 3/51

P (Both Ace)= 4/52 * 3/51 = 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 : Defective rate = 2%

So, non-defective rate = 98% = 0.98

P (all 5 non-defective) = (0.98) 5 power = 0.9039 (approx.)

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

Answer: Discrete Random Variable:
A random variable that takes **countable values**.
Example: Number of heads when tossing 3 coins (0, 1, 2, 3)

Continuous Random Variable:
A random variable that takes **any value in a given range**.
Example: Height of students, time taken to complete a task