## STATISTICS – 50 SOLVING QUESTIONS:

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**A. Population & Sample:**

1. A town has 50,000 people. A survey collects data from 2,000 people.
   Identify **population, sample, N and n**.
2. From a batch of 300 students, heights of 60 students are recorded.
   Find population size and sample size.
3. We want to find the average income of all Indians. Is this population or sample study? Explain with numbers.
4. A machine produces 10,000 bulbs daily. Quality is checked on 500 bulbs.
   Identify population and sample.
5. A dataset contains weights of all students in a class of 45.
   Is it population or sample? Why?

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**B. Mean (Average) – Population & Sample :**

6. Find the **mean** of:
   {5, 10, 15, 20, 25}
7. Find the **population mean** of:
   {2, 4, 6, 8}
8. Find the **sample mean** of:
   {12, 15, 18, 20, 25}
9. The sum of 8 observations is 240. Find the mean.
10. If the mean of 10 numbers is 25, find their total sum.
11. Find mean of:
    {1, 3, 4, 5, 100}
    (Note the effect of outlier)

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**C. Median :**

12. Find the **median** of:
    {7, 2, 9, 4, 5}
13. Find the median of:
    {10, 20, 30, 40}
14. Find the median of:
    {15, 5, 20, 10, 25, 30}
15. Dataset: {2, 3, 4, 5, 100}
    Find median and compare with mean.

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- **D. Mode :**

16. Find the mode of:
    {1, 2, 2, 3, 4, 5}
17. Find the mode of:
    {5, 5, 6, 6, 7, 7}
    (How many modes?)
18. Find the mode of:
    {10, 20, 30, 40}

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**E. Variance (Population & Sample) :**

19. Find the **population variance** of:
    {2, 2, 4, 4}
20. Find the **sample variance** of:
    {1, 1, 5, 5}
21. Find population variance of:
    {10, 12, 14, 16}
22. Find sample variance of:
    {5, 7, 9, 11}
23. Dataset A: {3, 3, 3, 3}
    Dataset B: {1, 3, 5, 7}
    Find variance of both and compare.

**F. Standard Deviation :**

24. Find **population standard deviation** of:
    {4, 6, 8, 10}
25. Find **sample standard deviation** of:
    {2, 4, 6, 8}
26. Find SD for:
    {10, 10, 10, 10}
    (Interpret result)
27. Mean = 20, variance = 9. Find SD.
28. Two datasets have SD = 2 and SD = 8.
    Which one is more spread?

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**G. Variable & Random Variable :**

29. Identify the type of variable:
    1. Number of students
    2. Weight
    3. Gender
    4. Temperature
30. Define a random variable for tossing two coins.
31. Define a random variable for rolling a die and finding even numbers.
32. Is height a discrete or continuous random variable? Justify.

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**H. Histogram :**

33. Create a frequency table (bin size = 10) for:
    {12, 18, 22, 25, 30, 35, 40, 45, 52}
34. How many bins will be formed if data range is 0–100 and bin width is 20?
35. Can histogram be drawn for gender data? Explain.
36. If bin size is too large, what happens to histogram shape?

**i. Percentiles & Quartiles :**

37. Find the **percentile rank** of 60 in:
    {10, 20, 30, 40, 50, 60, 70}
38. Find the **25th percentile** of:
    {2, 4, 6, 8, 10, 12}
39. Find Q1, Q2, Q3 of:
    {5, 10, 15, 20, 25, 30, 35}
40. What percentile is the median?
41. Find the 75th percentile position for n = 19.

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**J. Five Number Summary & Box Plot :**

42. Find the **five number summary** of:
    {1, 3, 5, 7, 9, 11, 13}
43. Find **IQR** for:
    {2, 4, 6, 8, 10, 12}
44. Find lower and upper fences if:
    Q1 = 10, Q3 = 18
45. Identify outliers in:
    {2, 4, 6, 8, 10, 25}

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**K. Covariance and correlation:**

1. Given the dataset X = [2, 4, 6] and Y = [50, 70, 90], calculate the sample mean ((\bar{x})) and ((\bar{y})).
2. If a dataset shows that when X increases, Y decreases, would the resulting covariance be positive or negative?
3. Calculate the covariance of X with itself (Cov(X, X)) for the dataset X = [2, 4, 6].
4. You calculate a Pearson correlation of 1.0. What does this value imply about the relationship between variable X and Y?
5. Convert the following raw data into ranks for a Spearman correlation calculation: X = [50, 10, 20, 40].