**Que 1) Plot a histogram,**

**10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 99**

Ans:-

Frequency

|

10-19 | \*\*

20-29 | \*\*\*

30-39 | \*\*\*

40-49 | \*\*\*

50-59 | \*\*

60-69 |

70-79 |

80-89 | \*

90-99 | \*\*\*

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Data Points

In this histogram:

* Each '\*' represents one data point.
* The numbers on the left represent the frequency of occurrence for each range of data points.
* The x-axis represents the ranges of data points.

**Que 2) In a quant test of the CAT Exam, the population standard deviation is known to be 100. A sample of 25 tests taken has a mean of 520. Construct an 80% CI about the mean.**

Ans:- To construct an 80% confidence interval (CI) about the mean, we'll use the formula:

CI=�ˉ±�(��)CI=*x*ˉ±*z*(*n*​*σ*​)

Where:

* �ˉ*x*ˉ is the sample mean,
* �*σ* is the population standard deviation,
* �*n* is the sample size, and
* �*z* is the z-score corresponding to the desired confidence level.

For an 80% confidence level, we need to find the z-score associated with the middle 80% of the standard normal distribution. This value can be found using a standard normal distribution table or calculator. Typically, for an 80% confidence interval, the z-score is approximately 1.282.

Given:

* Population standard deviation (�*σ*) = 100
* Sample size (�*n*) = 25
* Sample mean (�ˉ*x*ˉ) = 520

Substituting the given values into the formula:

CI=520±1.282(10025)CI=520±1.282(25​100​)

CI=520±1.282(1005)CI=520±1.282(5100​)

CI=520±1.282×20CI=520±1.282×20

CI=520±25.64CI=520±25.64

Now, we can calculate the confidence interval:

Lower limit: 520−25.64=494.36520−25.64=494.36

Upper limit: 520+25.64=545.64520+25.64=545.64

So, the 80% confidence interval about the mean is (494.36,545.64)(494.36,545.64).

**Que 3) A car believes that the percentage of citizens in city ABC that owns a vehicle is 60% or less. A sales manager disagrees with this. He conducted a hypothesis testing surveying 250 residents & found that 170 residents responded yes to owning a vehicle.**

1. State the null & alternate hypothesis.
2. At a 10% significance level, is there enough evidence to support the idea that vehicle owner in ABC city is 60% or less.

Ans:-

a. **Null Hypothesis (H0):** The percentage of citizens in city ABC that owns a vehicle is 60% or less. �0:�≤0.60*H*0​:*p*≤0.60

**Alternative Hypothesis (H1):** The percentage of citizens in city ABC that owns a vehicle is greater than 60%. �1:�>0.60*H*1​:*p*>0.60

Where:

* �*p* represents the population proportion of citizens in city ABC that owns a vehicle.

b. To determine whether there is enough evidence to support the idea that the percentage of vehicle owners in ABC city is 60% or less, we need to conduct a hypothesis test.

Given:

* Sample size (�*n*) = 250 residents
* Number of residents who responded yes to owning a vehicle (�*x*) = 170 residents
* Level of significance (�*α*) = 0.10

We will use a one-tailed test because the alternative hypothesis suggests a direction (greater than 60%).

Now, let's perform the hypothesis test.

1. **Calculate the sample proportion (�^*p*^​)**: �^=��=170250=0.68*p*^​=*nx*​=250170​=0.68
2. **Calculate the standard error (��*SE*)** of the sample proportion: ��=�^(1−�^)�=0.68×(1−0.68)250≈0.0311*SE*=*np*^​(1−*p*^​)​​=2500.68×(1−0.68)​​≈0.0311
3. **Calculate the test statistic (z-score)** using the sample proportion (�^*p*^​) and the population proportion (�*p*) under the null hypothesis: �=�^−���=0.68−0.600.0311≈2.58*z*=*SEp*^​−*p*​=0.03110.68−0.60​≈2.58
4. **Find the critical value** for �=0.10*α*=0.10 (one-tailed test). Using a standard normal distribution table or calculator, ��≈1.282*zα*​≈1.282.
5. **Compare the test statistic to the critical value**:
   * Test statistic �=2.58*z*=2.58 is greater than the critical value ��≈1.282*zα*​≈1.282.
6. **Make a decision**:
   * Since the test statistic is in the rejection region (greater than the critical value), we reject the null hypothesis.

Conclusion: At a 10% significance level, there is enough evidence to support the idea that the percentage of vehicle owners in ABC city is greater than 60%.

**Que 4) What is the value of the 99 percentile?**

2,2,3,4,5,5,5,6,7,8,8,8,8,8,9,9,10,11,11,12

Ans:-

To find the 99th percentile from the given data, we need to find the value below which 99% of the data falls.

First, let's arrange the data in ascending order:

2,2,3,4,5,5,5,6,7,8,8,8,8,8,9,9,10,11,11,122,2,3,4,5,5,5,6,7,8,8,8,8,8,9,9,10,11,11,12

Since there are 20 data points, the 99�ℎ99*th* percentile corresponds to the value at position 0.99×20=19.80.99×20=19.8. Since percentiles are positions and must be whole numbers, we'll round up to 20.

So, the 99�ℎ99*th* percentile corresponds to the value at the 20th position in the ordered data, which is 1111.

Therefore, the value of the 99�ℎ99*th* percentile is 1111.

**Que 5) In left & right-skewed data, what is the relationship between mean, median & mode?**

Draw the graph to represent the same.   
In left-skewed (negatively skewed) data:

* The mean is less than the median, and the median is less than the mode.
* The mode is the highest point, followed by the median, and then the mean.
* The tail of the distribution extends to the left.

In right-skewed (positively skewed) data:

* The mean is greater than the median, and the median is greater than the mode.
* The mode is the highest point, followed by the median, and then the mean.
* The tail of the distribution extends to the right.

Let's visualize this relationship with graphs:

Left-skewed data:

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|\* \* \* \* \* \* \* \* \* \* \*

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Mode Median Mean

Right-skewed data:

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Mode Median Mean

In both cases, the mode represents the highest point, followed by the median, and then the mean. However, their positions relative to each other differ based on the skewness of the data.