**Que 1) Plot a histogram,**

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

Ans:

Chart, histogram

Description automatically generated

**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 a confidence interval for the population mean, we can use the formula:

CI = x̄ ± (tα/2 \* s/√n)

where:

x̄ = sample mean = 520

s = sample standard deviation = population standard deviation / sqrt(n) = 100 / sqrt(25) = 20

n = sample size = 25

tα/2 = t-score for the given confidence level and degrees of freedom (df = n-1)

Since we want to construct an 80% confidence interval, the corresponding alpha level is 0.1 (1 - 0.8 = 0.2, and we divide this by 2 to get the two-tailed alpha level of 0.1). Using a t-table or calculator with degrees of freedom (df) = 24, we can find the t-score for alpha/2 = 0.05 to be 1.711.

Plugging in the values, we get:

CI = 520 ± (1.711 \* 20 / sqrt(25))

CI = 520 ± 13.69

CI = (506.31, 533.69)

Therefore, we can say with 80% confidence that the true population mean lies between 506.31 and 533.69.

**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) The null hypothesis is that the true proportion of vehicle owners in city ABC is equal to or greater than 60%, while the alternative hypothesis is that the true proportion of vehicle owners in city ABC is less than 60%.

H0: p >= 0.6

Ha: p < 0.6

where p is the population proportion of vehicle owners in city ABC.

b) To test this hypothesis, we can use a one-tailed z-test for proportions.

The test statistic can be calculated using the formula:

z = (p̂ - p0) / sqrt(p0\*(1-p0)/n)

where:

p̂ = sample proportion of vehicle owners = 170/250 = 0.68

p0 = hypothesized proportion of vehicle owners = 0.6

n = sample size = 250

Plugging in the values, we get:

z = (0.68 - 0.6) / sqrt(0.6\*(1-0.6)/250)

z = 2.04

At a 10% significance level, with a one-tailed test, the critical z-value is -1.28 (from the z-table). Since our calculated z-value of 2.04 is greater than the critical value of -1.28, we reject the null hypothesis and conclude that there is enough evidence to support the idea that the proportion of vehicle owners in city ABC is less than 60% at a 10% significance level.

**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 value of the 99th percentile, we need to first 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, 12

The 99th percentile represents the value below which 99% of the data falls. To find this value, we need to identify the rank of the 99th percentile using the formula:

Rank = (percentile/100) x (n + 1)

where n is the total number of observations. For the 99th percentile, percentile = 99 and n = 20, so:

Rank = (99/100) x (20 + 1) = 0.99 x 21 = 20.79

Since the rank is not a whole number, we need to take the average of the 20th and 21st observations to get the value of the 99th percentile. The 20th observation is 11 and the 21st observation is 12, so:

99th percentile = (11 + 12)/2 = 11.5

Therefore, the value of the 99th percentile is 11.5.

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

**Ans:** In left-skewed data, the mean is typically less than the median, which is less than the mode. This is because the tail of the distribution is on the left side, pulling the mean to the left of the median and the mode to the left of both the mean and the median.

In right-skewed data, the mean is typically greater than the median, which is greater than the mode. This is because the tail of the distribution is on the right side, pulling the mean to the right of the median and the mode to the right of both the mean and the median.

In a symmetrical distribution, the mean, median, and mode are all equal. However, in skewed distributions, they can differ significantly. Therefore, the skewness of the data can affect the relationship between mean, median, and mode.