

Statistics Assignment

Date: _____
MON TUE WED THU FRI SAT SUN

1) Plot an histogram,

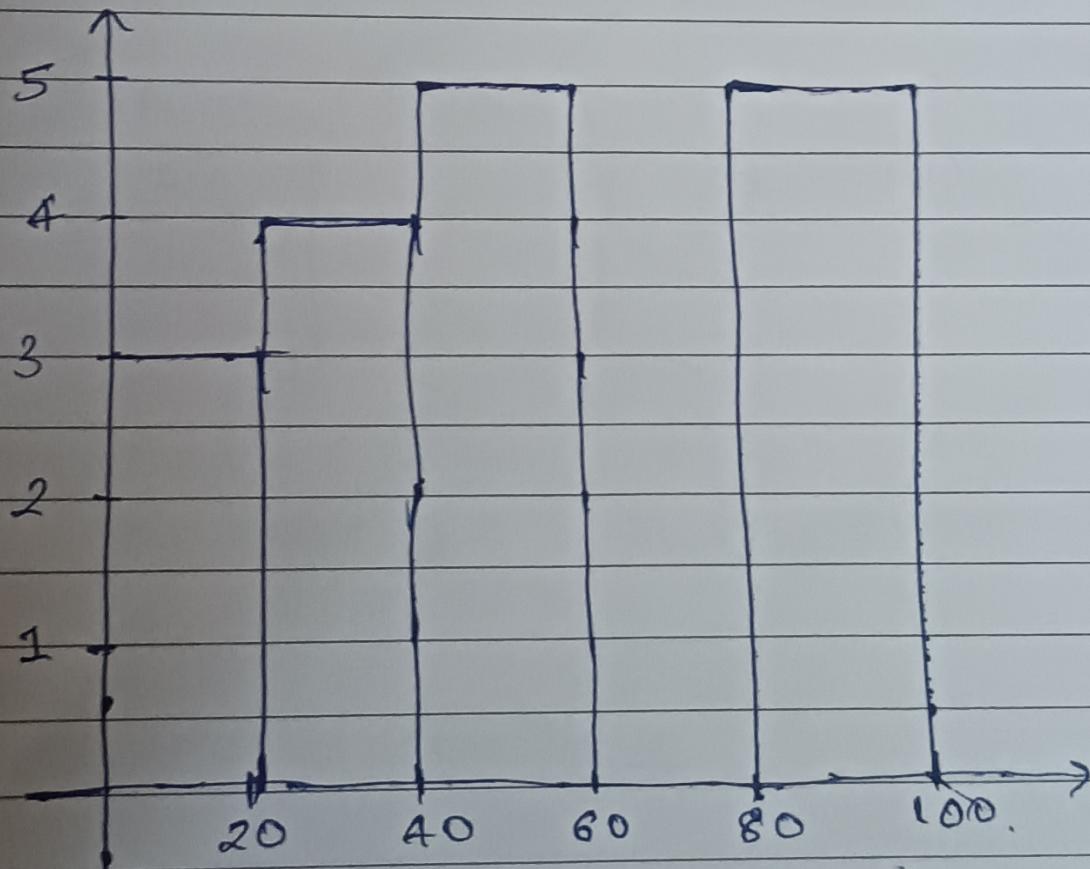
10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88,
90, 92, 94, 99

a) Sort to the ascending order

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

b) No of groups → Bins → 5

c) Bin Size = $\frac{100}{5} = 20$



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

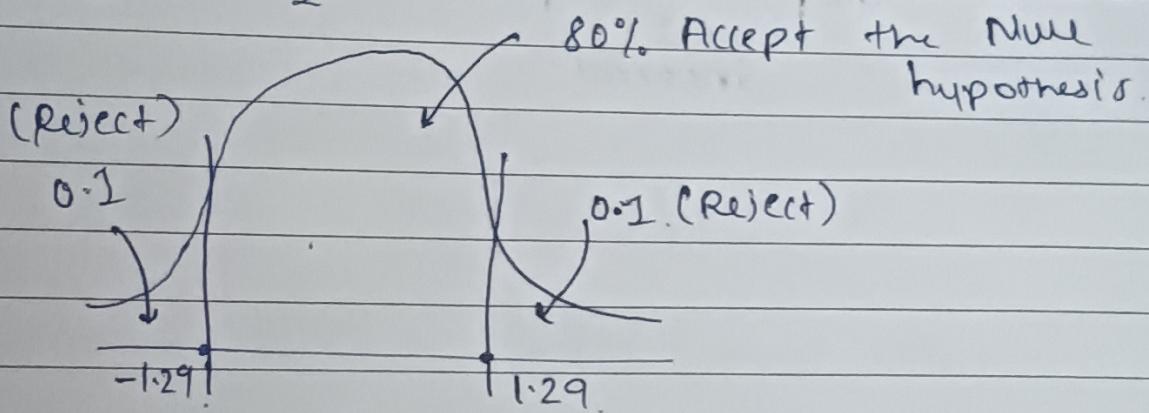
Data : $n=25$, $\sigma=100$, $\bar{x}=520$, $C-I=80\%$.

Point estimate \pm Margin of error

$$\bar{x} \pm Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$$

$$(\text{Significance error}) \alpha = 1 - C-I = 1 - 80\% \\ = 0.2.$$

$$Z_{\frac{\alpha}{2}} = Z_{0.2} = Z_{0.1}$$



$$\text{Hole area} = 1, \text{ then } 1 - 0.1 = 0.9.$$

then value of 0.9 as per z-score table
is . 1.29

$$\text{lower fence} = \bar{x} - Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$$

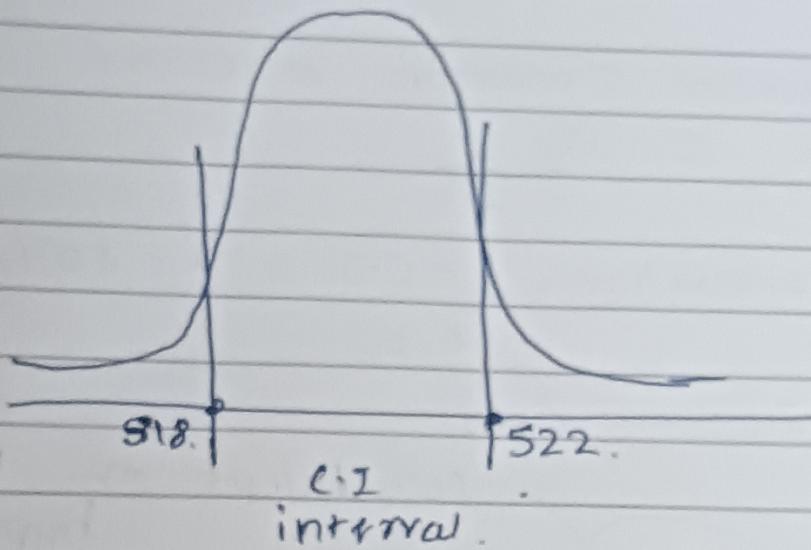
$$= 520 - 0.1 \times \frac{100}{\sqrt{25}} = 518$$

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$$\text{Higher fence} = \bar{x} + Z_{\alpha} \frac{\sigma}{\sqrt{n}}$$
$$= 520 + 0.1 \times \frac{100}{\sqrt{28}} = 522.$$

Final C.I interval is



- 3) A car believed 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.

a) State the Null & alternate hypothesis

b) At 10% Significance level, is there enough evidence to support the idea that vehicle owner in ABC city is 60% or less.

→ Z-test with proportions

1) One tail test

Null hypothesis (H_0) : $P_0 \leq 60\%$

Alternate hypothesis (H_1) : $P_0 > 60\%$

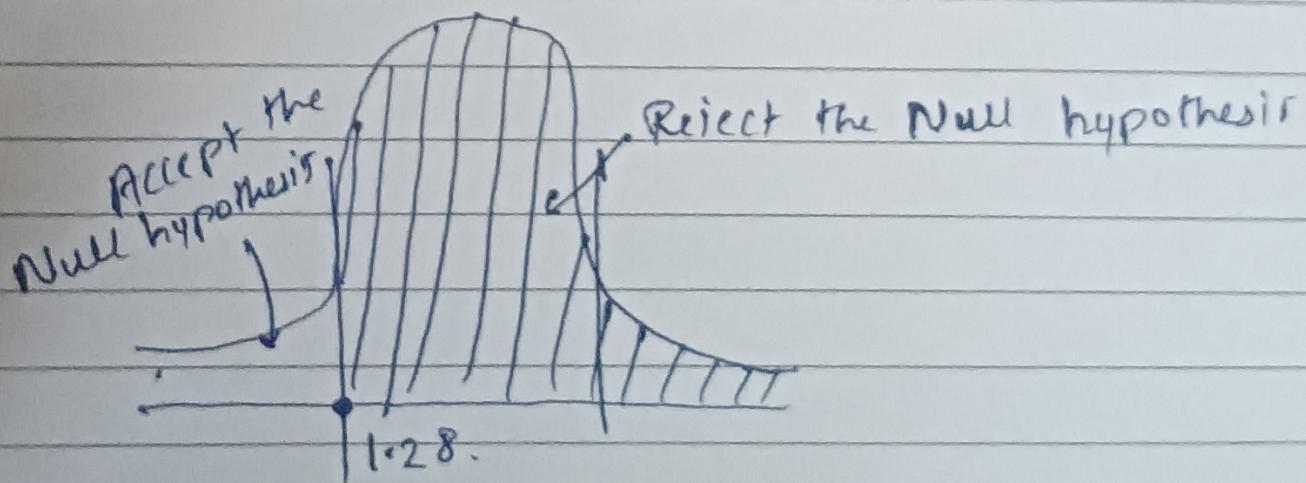
$$q_0 = 1 - P_0 = 0.4$$

$$\hat{P} = \frac{x}{n} = \frac{170}{250} = 0.68$$

2) Significance level = $1 - C.I = \text{over. } 10\% = 0.1$

3) Decision Boundary.

Z-value for 10% significance level is 1.28.



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4) Test analysis

$$\begin{aligned}
 Z_{\text{test}} &= \frac{\hat{P} - P_0}{\sqrt{\frac{P_0 V_0}{n}}} \\
 &= \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{250}}} \\
 &= 1.633
 \end{aligned}$$

$1.633 > 1.28$ i.e. Reject the Null hypothesis.

5) Conclusion :

There is enough evidence to support the idea that the percentage of citizens in city ABC that owns a vehicle is greater than 60%.

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4) What is the value of 99 Percentile?

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

$$\begin{aligned} \text{Index} &= \frac{\text{Percentile} \times (n+1)}{100} \\ &= \frac{99}{100} \times 21 \\ &= 20.79. \end{aligned}$$

since index is not whole number, we need to take average of the 20th & 21st values to get the corresponding to the 99th percentile.

$$99^{\text{th}} \text{ percentile value} = (11 + 12)/2 = 11.5$$

Therefore, the value of 99th percentile is 11.5.

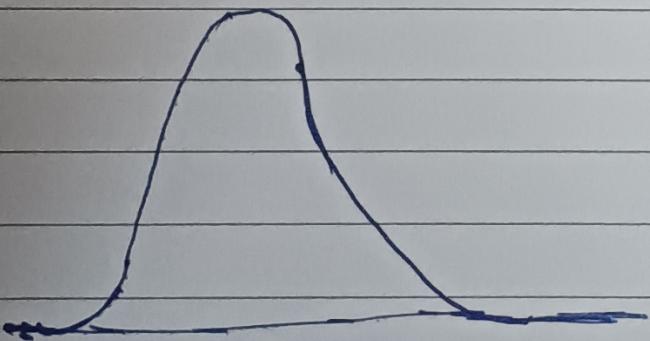
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5) In left & right skewed data, what is the relationship between mean, median & mode?
Draw the graph to represent the same.

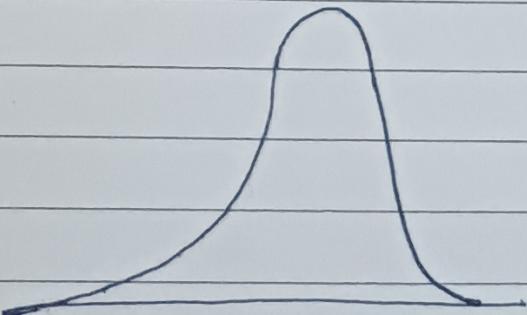


In left skewed data, the mean is usually less than the median, which is less than the mode. This is because the tail of the distribution is pulling the mean to the left, making it lower than the median, while the peak of the distribution is pulling the mode to the right, making it higher than the median.

In right skewed data, the mean is usually greater than the median, which is greater than the mode. This is because the tail of the distribution is pulling the mean to the right, making it higher than the median, while the peak of the distribution is pulling the mode to the left, making it lower than the median.



Right-skewed.



Left-skewed.