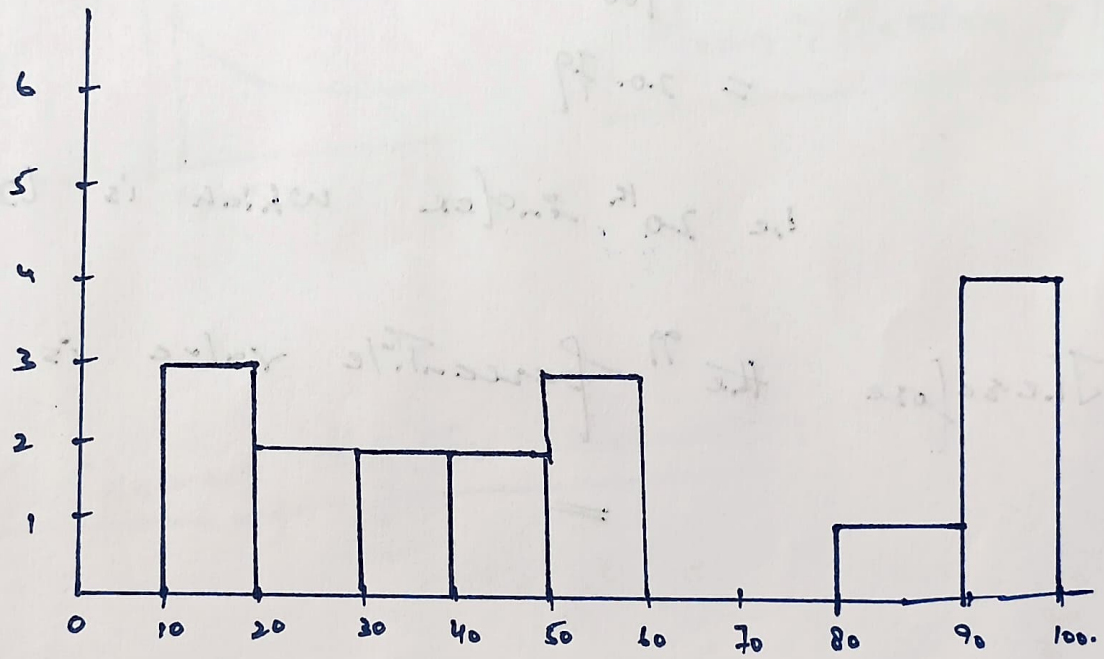
Que 1) Plot a histogram,

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

Sol. :

Considering Bins = 10.

$\therefore$ Bin Size $= \frac{100}{10} = 10$ [Range 0–100].



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.

Sol. :

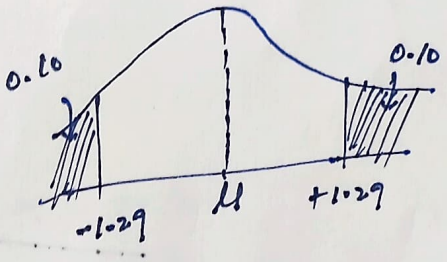
Given $\sigma = 100$

$\bar{x} = 520$

$n = 25$

$CI = 80\%$, $\therefore \alpha = 0.20$

$$C.I = \bar{x} \pm Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$$



$Z_{\frac{\alpha}{2}} \Rightarrow Z_{\frac{0.20}{2}} = Z_{0.10}$

$= 1 - 0.10$

$= 0.9$

i.e. $\underline{1.29}$ (from Z-Table)

upper limit $\Rightarrow 520 + (1.29)\left(\frac{100}{\sqrt{25}}\right) = \underline{545.8}$

Lower limit $\Rightarrow 520 - (1.29)\left(\frac{100}{\sqrt{5}}\right) = \underline{494.2}$

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.

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

Sol:- [Using One-Sample Z-Test with proportion]

Step 1: Null hypothesis:

$H_0 : P \leq 0.60$

Step 2: Alternate Hypothesis:

$H_1 : P > 60$

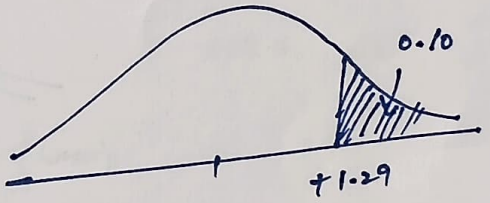
Step 3: Significance value, $\alpha = 0.10$.

Step 4: Decision Rule:

* one Tail Test:

$\Rightarrow 1 - 0.10 = 0.90$

$= 1.29$ (z-Table).



Step 5: Z-Test Statistics:

$$Z_0 = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}}$$

where, $\hat{p}$ is prob. w.r.t sample

i.e $\frac{170}{250} \Rightarrow \boxed{\hat{p} = 0.68}$

p_0 is given proportion.

$\boxed{p_0 = 0.60}$

and $n = 250$ (given sample)

Substituting values:

$$Z_0 = \frac{0.68 - 0.60}{\sqrt{\frac{0.60(1-0.60)}{250}}}$$

$$= \frac{0.08}{0.03} = 2.67$$

Conclusion:

Since $2.67 > 1.29$

Hence we reject the Null Hypothesis. and accept alternate hypothesis.

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

Sol. :

$$\text{Value} = \frac{\text{Percentile}}{100} \times (n+1)$$

$$= \frac{99}{100} \times 21$$

$$= 20.79$$

i.e 20^{th} index which is 12.

Therefore the 99 percentile value is 12.

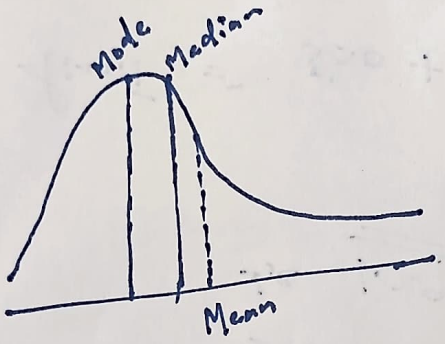
=

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

Draw the graph to represent the same.

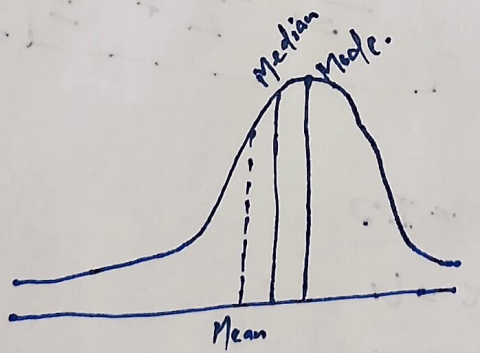
Sol. :

Right Skewed / Positive Skewed:



Mean > Median > Mode

Left Skewed / Negative Skewed:



Mean < Median < Mode.