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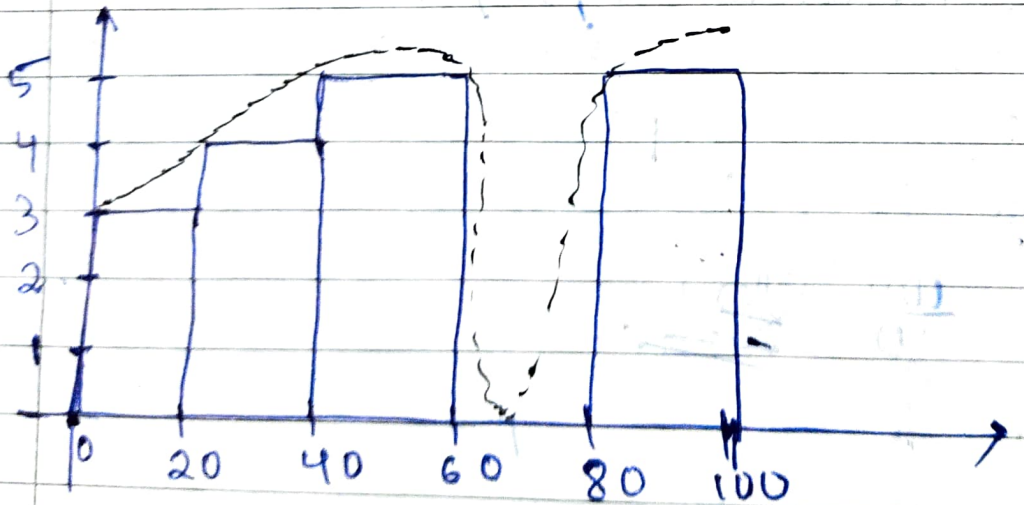
Day 1 - Stats

Assignment

③ E.g.; 10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 99

bins = 5 minimum
bin size = 20



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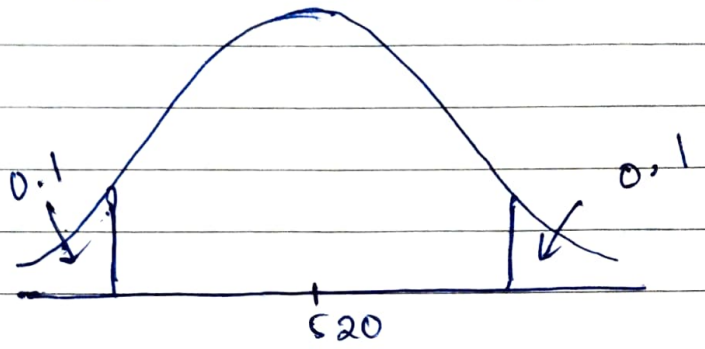
Statistics Day-5 assignment

Q In the Quant test of CAT exam, the population standard deviation is known to be 100. A sample of 25 test takers has a mean of 520. Construct a 80% CI about the mean.

Soln $\sigma = 100$, $n = 25$, $\bar{x} = 520$, CI = 80%.

Significance value (α) = 1 − 80% = ~~0.027~~ 1 − 0.80 = 0.2



Parameter = Point estimate ± Margin of error.

$$= \bar{x} \pm Z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$$

$$Z_{\alpha/2} = Z_{\frac{0.2}{2}} = Z_{0.1} = 0.53983$$

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

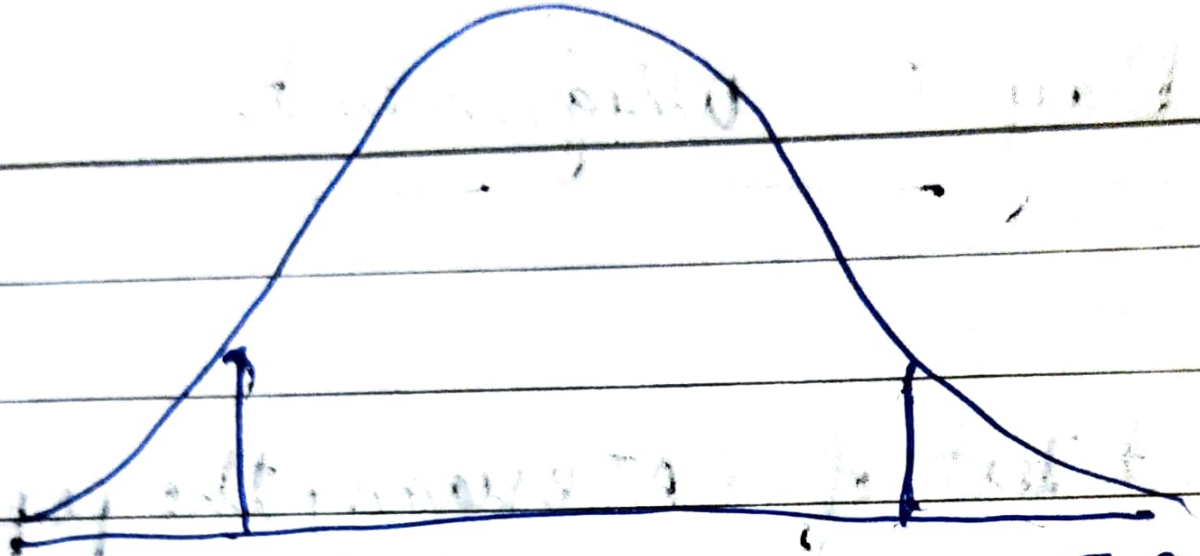
$$= 520 - 0.53983\left(\frac{100}{5}\right)$$

$$= 520 - 0.53983\,(20)$$

$$= 509.2034$$

Higher fence $= \bar{x} + Z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$

$$= 520 + 0.53983 = 530.7966$$


509.2034
530.7966

Q A car company believes that the percentage of residents in city ABC that owns a vechicle is 60% ~~or less~~. A sales manager disagrees with this, he conducts a hypothesis testing surveying 250 residents and finds that 170 responded yes to owning a vechicle

a) Null & Alternate hypotheses.

b) $\alpha = 10\%$, is there enough evidence to support the idea that vechicle ownership in city ABC is 60% or different (2 tale z test)

Soln i) $H_0 \rightarrow P_0 = 60\%$

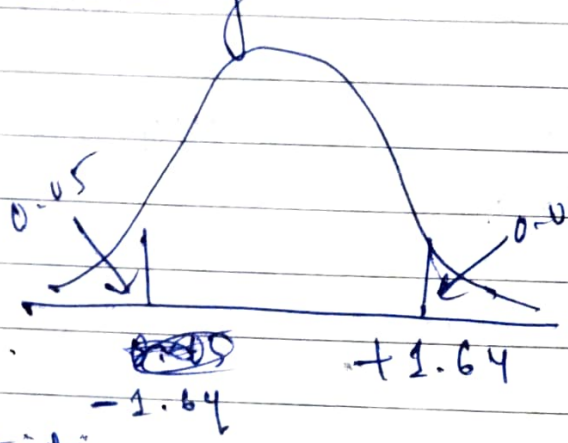
$H_1 \rightarrow P_0 \neq 60\%$ $P_0 = 0.60$.

ii) $n = 250$, $\hat{P} = \frac{170}{250} = 0.68$, $q_0 = 1 - P_0 = 0.40$

iii) Decision boundary :-

$\alpha = 10\% = 0.1$, C.I = 90%

iv) Decision boundary :-



v) Test statistics :-

$$Z = \frac{\hat{P} - P_0}{\sqrt{P_0 q_0 / n}} = \frac{0.68 - 0.60}{\sqrt{\frac{(0.60)(0.40)}{250}}}$$

$$= \frac{0.08}{\sqrt{\frac{0.24}{250}}} \qquad \frac{0.08}{\sqrt{0.000096}}$$

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

vi) Conclusion :-

$2.67 > 1.64$ (so, reject the null hypothesis).

Q. What is the value of 99 percentile?

Given data:-

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

(11)

Soln

$n = 20$

$$\text{Value} = \frac{\text{Percentile}}{100} * n$$

$$\Rightarrow \text{Value} = \frac{99}{\cancel{100}_{5}} * \cancel{20} = (19.5)^{th} \text{ index}$$

$$\cong 12$$

Q) In left and right-skewed data, what is the relationship between mean, median and mode? Represent with graph

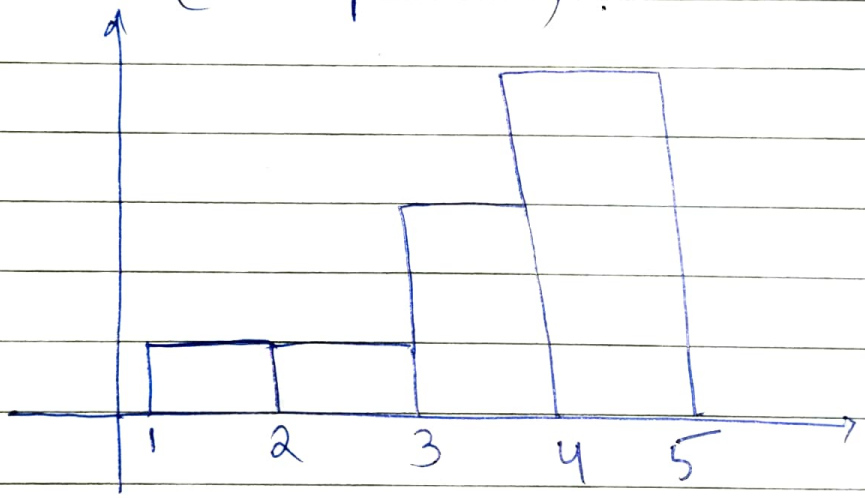
Ans

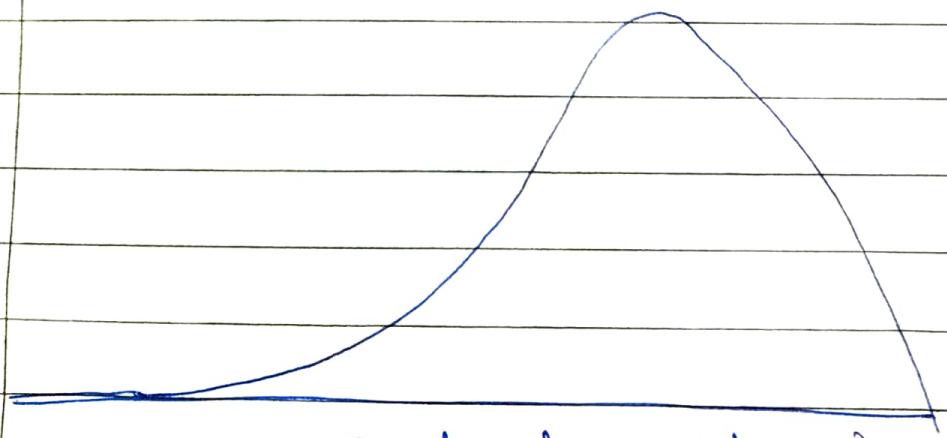
Left-skewed:-

In left-skewed data, the mean is less than the median and the median is less than the mode. It is often referred to as negative skew.

Mean < Median < Mode

Graph:- (Example:-)





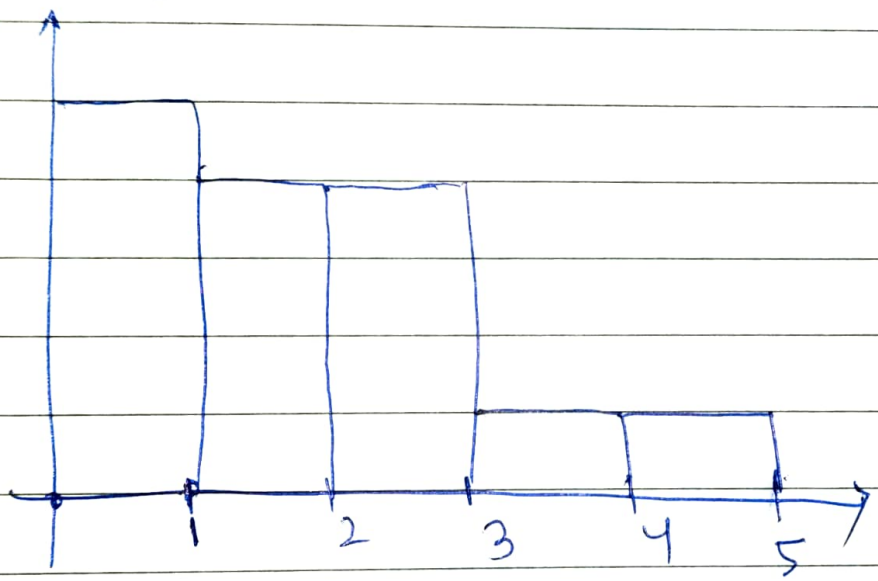
(Negative skew)

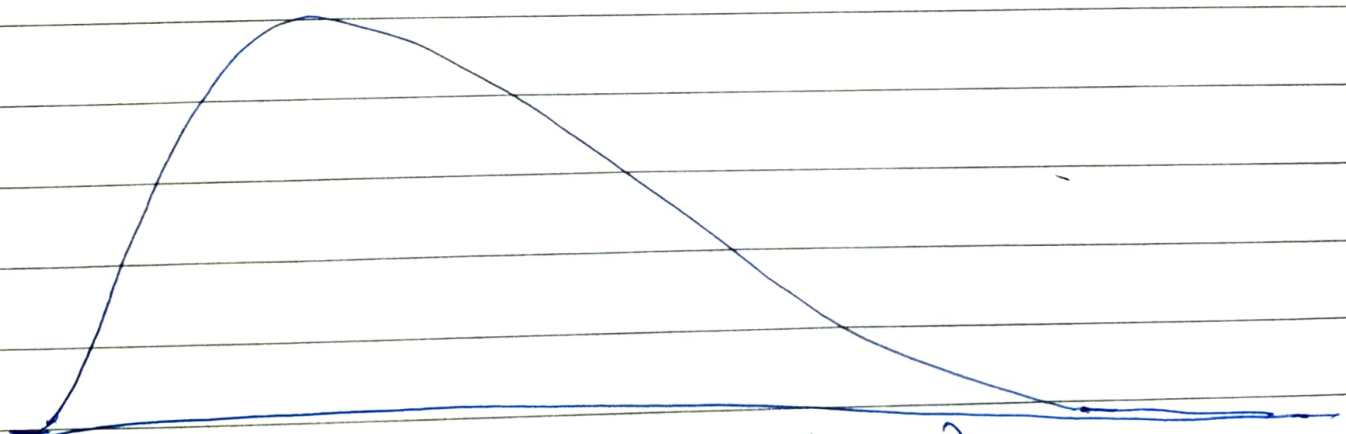
Right skewed :—

In right - skewed data, the mode is less than median and median is less than mean.
It is often referred to as positive skew.

Mode > Median > Mean

Graph :— (example)





(positive skew).