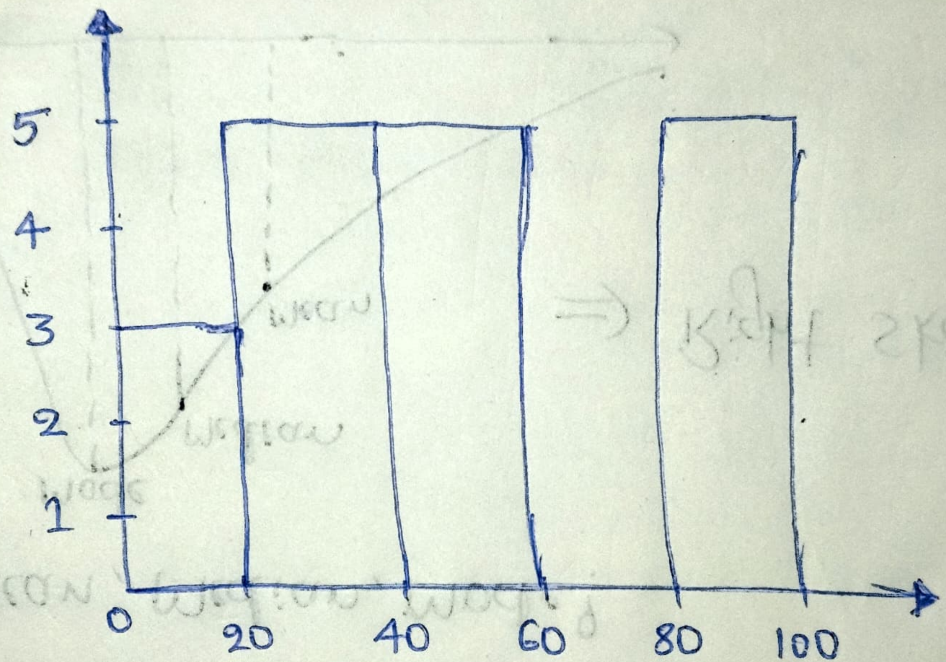
Q1) Plot a histogram,

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

$\Rightarrow$ Bins = 5, Bin size = $\frac{\text{Range}}{\text{Bins}} = \frac{100}{5} = 20$

Range $\to$ [0, 100]



[redacted]

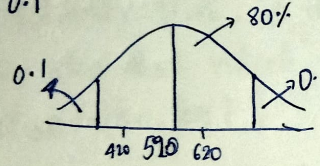
Q) In the Quant test of CAT exam, the population standard deviation is known to be 100. A sample of 25 test takers has a mean of 520. Construct a 80% C.I about the mean?

$\Rightarrow$ $\sigma = 100$, $n = 25$, $C.I = 0.8$, $\alpha = 1 - 0.8 = 0.2$

$\bar{x} = 520$, $Z_{\frac{\alpha}{2}} = Z_{0.1} = 1.28$ $\quad$ [1-0.1=0.9]

See t-table for 0.9.

$\Rightarrow$



$\Rightarrow$ Point estimate $\pm$ margin of error.

Lower fence = Point estimate - Margin of error

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

$= 520 - 1.28 \times \frac{\cancel{100}\,20}{\cancel{\sqrt{25}}\,1}$

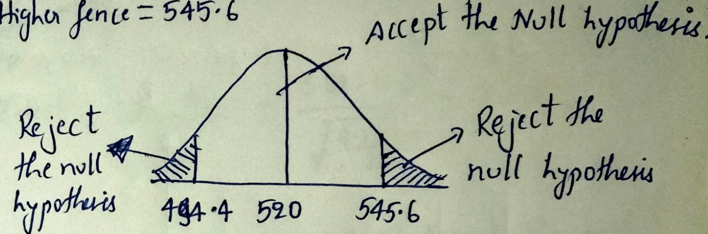
$= 520 - 1.28 \times 20$

Lower fence $= 494.4$

Higher fence $= \bar{x} + Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$

$= 520 + 1.28 \times \frac{100}{\sqrt{25}}$

Higher fence $= 545.6$



~~Assignment~~

Q3) A car company believes that % of residents in city ABC has own a vehicle is 60% or less. A sales manager disagrees with this. He conducts a hypothesis testing surveying 250 residents & found that 170 responded yes to owning a ~~b~~ vehicle.

a) State the null & alternate hypothesis.

b) At 10% significance level, is there enough evidence to support the idea that vehicle ownership in city ABC is 60% or less?

⇒ Given :- 60% or less ⇒ One tail test.

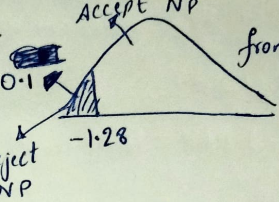
$n = 250$, ~~p~~ $x = 170$, ~~α = 0.01~~ $\alpha = 0.1$

1) $H_0 : P_0 \leq 60\%$

$H_1 : P_0 > 60\%$

2) ~~α = 0.01~~ $\hat{p} = \frac{x}{n} = \frac{170}{250} = 0.68$

$P_0 = 0.6, \quad q_0 = 1 - 0.6 = 0.4.$

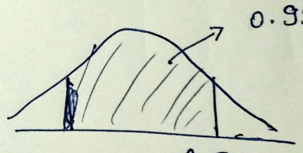
3) 

from Z-table, for 0.1 ⇒ Z-value = -1.28

4) $Z\text{ test} = \frac{\hat{P} - P_0}{\sqrt{\frac{P_0 q_0}{n}}} = \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{200}}} = 2.581$

5) Conclusion :- $2.581 > -1.28$ ⇒ Accept the null hypothesis.

Another method :-



P-value = 0.99506

P-value > Significance ⇒ $0.99506 > 0.1$

∴ Accept the null hypothesis.

Q4) 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.

$\Rightarrow$ $\underline{12}$

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

$$x = 20.79$$

$\underline{\text{value} = 12}$

~~Ass~~ Assignment - 2

~~Assignment 2~~

1) For $\sigma^2 = \frac{\sum_{i=1}^{N}(x_i-\bar{x})^2}{N}$, $s^2 = \frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{n-1}$

Why for sample Standard deviation, n-1 is used?

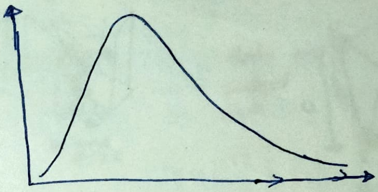
⇒ * If we take many samples from the population which has the mean (μ).

* Calculate the sample mean ($\bar{x}$) & average all the sample means. We should find that average is very close to μ.

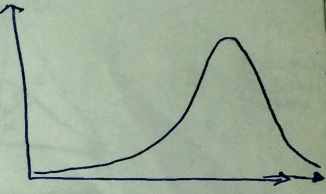
* However, if we calculate the variance of each sample by the formula $\frac{\sum(x_i-\bar{x})^2}{n}$, then average of sample variance is found & we would probably find that their average is less than σ^2. So, we compensate for this by dividing by (n-1) for sample variance (s^2)

Assignment - 3

1)



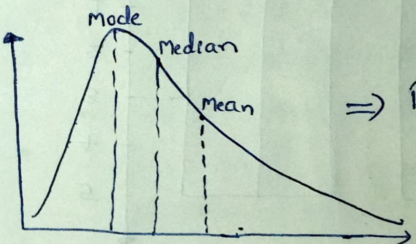
Right-Skewed



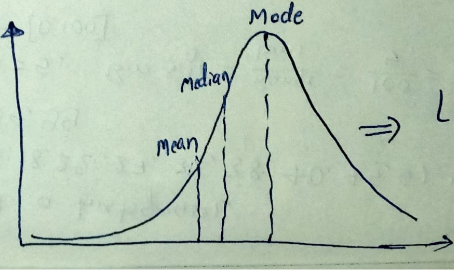
left skewed.

Find mean, Median, Mode?

⇒



⇒ Right Skewed.



⇒ Left skewed.