

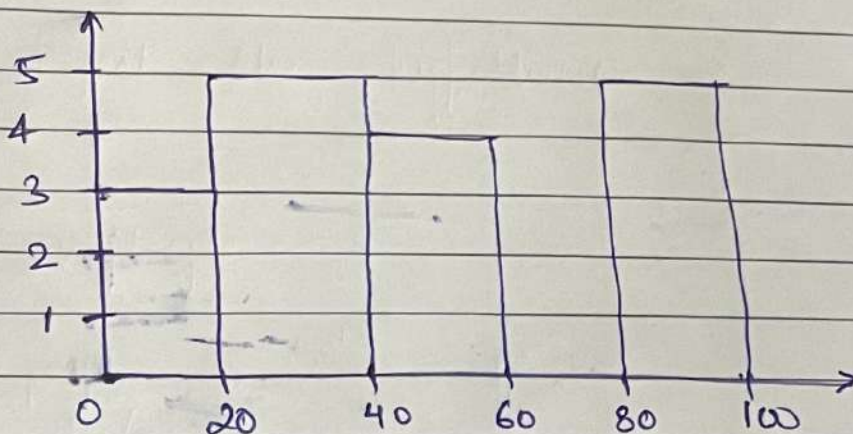
Assignment

① Draw histogram:

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

Bin = 5

Bin size = 20



② In a quantest of CAT exam, $\sigma = 100$.
 $n = 25$, $\bar{x} = 520$. Construct a 80% CI about mean?

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

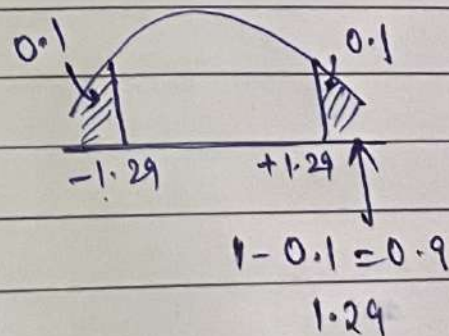
$$Z_{\alpha/2} = Z_{0.2/2} = Z_{0.1}$$

$$\text{Lower fence} = 520 - 1.29 \times \frac{100}{\sqrt{25}}$$

$$= 494.2$$

$$\text{Higher fence} = 520 + 1.29 \times \frac{100}{\sqrt{25}}$$

$$= 545.8$$



(3) A car company believes that the percentage of residents in city ABC that owns 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 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?

Ans) ① Null hypothesis, $H_0: P_0 \leq 60\%$
 $H_1: P_0 > 60\%$

↓
1-Tail

$$n = 250, \quad x = 170$$

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

$$q_0 = 1 - P_0 = 1 - 0.6 = 0.4$$

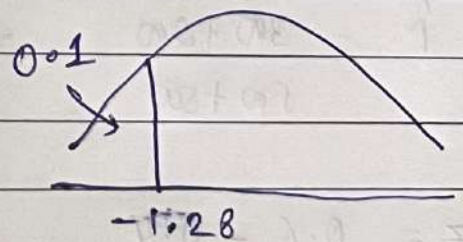
② $\alpha = 0.1$

③ Decision Boundary

④ Since $n > 30$, we use z-test

$$z\text{-test} = \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{250}}}$$

$$= 2.588$$



Conclusion, $2.588 > -1.28$, we accept the null hypothesis, i.e., there is enough evidence to support the idea that vehicle ownership in city ABC is 60% or less.

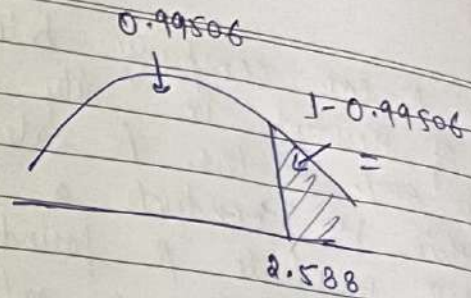
Using P-value

$$Z\text{-score} = 2.588$$

$$P\text{-value} = 0.00494$$

$$|P\text{-value}| < \alpha$$

Reject the hypothesis. ??
=



24) 100 K employee

$n = 500$ people \Rightarrow 300 XL & 200 L

$\alpha = 95\%$

Ans) $P_1 = 300 \text{ XL}$, $P_2 = 200 \text{ L}$

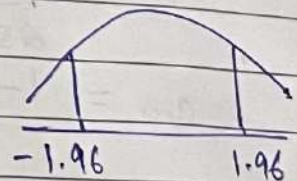
$$H_0: P_1 = P_2$$

$$H_1: P_1 \neq P_2$$

$$\alpha = 0.05$$

$$\hat{P}_1 = \frac{300}{500} = 0.6, \quad \hat{P}_2 = \frac{200}{500} = 0.4$$

$$\hat{P} = \frac{300 + 200}{500 + 500} = 0.6$$



$$z = \frac{0.6 - 0.4}{\sqrt{0.6(1-0.6) \left(\frac{1}{500} + \frac{1}{500} \right)}}$$

$$z = 1.626$$

Since, $1.626 > -1.96$, we accept the null hypothesis.
Hence, 50,000 XL & 50K L should be ordered.

- (4) 2, 2, 3, 4, 5, 5, 5, 6, 7, 8, 8, 8, 8, 8, 9, 9, 10, 11, 11, 12
What is 99 percentile?

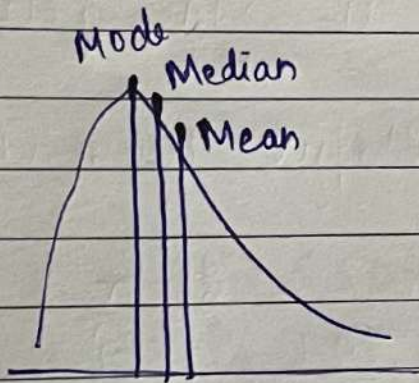
$$\text{Value} = \frac{\text{Percentile}}{100} \times (n+1)$$

$$= \frac{99}{100} \times (20+1)$$

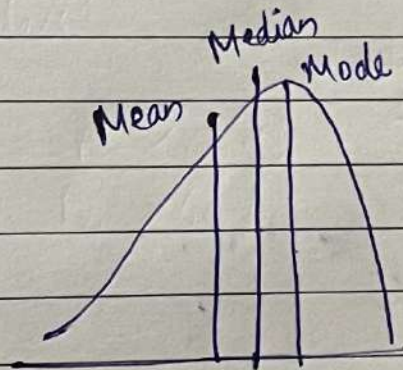
$$= 20.79 \text{ th index which is } 12$$

so, value of 99 percentile is 12.

(5)



Right skewed
 $\text{Mean} > \text{Median} > \text{Mode}$



Left skewed
 $\text{Mean} < \text{Median} < \text{Mode}$