Assignment: Statistics

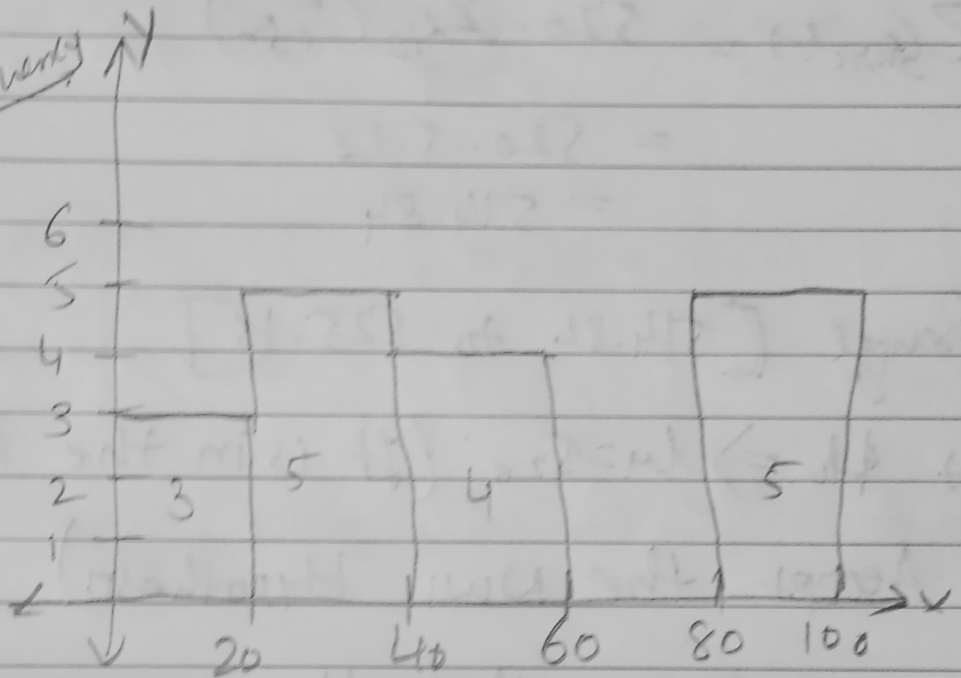
Q:1 plot a Histogram.

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

Ans

Bins = 5

Bin Size = 20



Histogram

Q:2 In a quant test of the CAT Exam, the Population S.D is known to be 106. A Sample of 25 tests taken has a mean of 520. Construct 80% CI about the mean.

→ Ans: $\sigma = 100$, $n = 25$, $\alpha = 0.2$, CI = 80

$H_0 = \mu = 526$

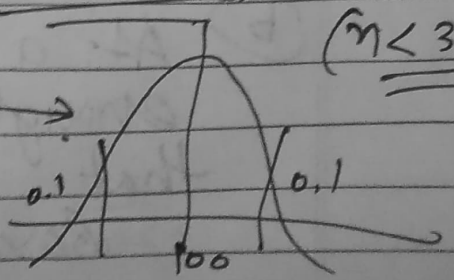
H_1 $\mu \neq 526$

$\bar{x} = 520$

$(1 - 0.8 = 0.2)$

$\alpha = 0.2 \Rightarrow$ $1 - 0.1 = 0.9$ →

($n < 30$)



Z-value = 1.29

$$Z_{score}(+) = 520 + Z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$$

$$= 520 + Z_{0.1}\left(\frac{100}{25}\right)$$

$$= 520 + 1.29(4)$$

$$= 525.16$$

$$Z_{score}(-) = 520 - Z_{\alpha/2}\left(\frac{\sigma}{\sqrt{n}}\right)$$

$$= 520 - 5.16$$

$$= 514.84$$

↳ Range [514.84 to 525.16]

↳ $H_0 \Rightarrow \mu = 526$ (It is in the range)

Accept the Null Hypothesis)

Q:3 A car believes that the percentage of citizen in city ABC that owns a vehicle is 60% or less. A sales manager disagree with this. He conducted a Hypothesis Testing surveying 250 resident & found that 170 residents responded yes to owning a vehicle.

(a) State the null Hypothesis & alternate Hypothesis.

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

(3)

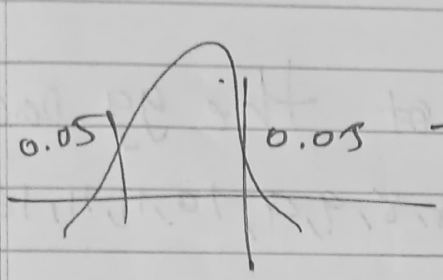
↳ Ans: Null Hypothesis ⇒ $H_0 \Rightarrow P_0 \leq 60\%$

$H_1 \Rightarrow P_0 > 60$

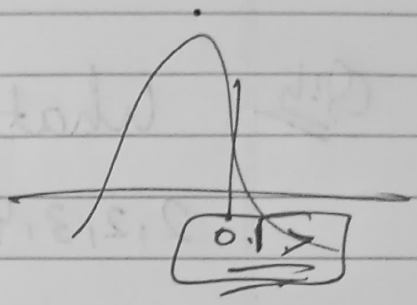
$n = 250 \quad x = 170$

one tail test ⇒ $P_0 \leq 60$

⇒ 10% S.I ⇒ 0.1 ⇒ $\alpha = 0.1$



→ but one tail



$\hat{p} = x/n = \frac{170}{2} = 85 \Rightarrow 85\% \Rightarrow 0.85$

~~$q = P_0 - 1$~~ $q = 1 - P_0 = 1 - 0.6$

$= 0.4$

(2) $\alpha = 0.1 \Rightarrow 1 - 0.1$

$= 0.9$

↳ Z-value = ±1.29

$Z\text{-test} \Rightarrow \frac{\hat{p} - P_0}{\sqrt{\frac{P_0 Z_0}{n}}} = \frac{0.85 - 0.60}{\sqrt{\frac{0.6 \times 0.4}{250}}}$

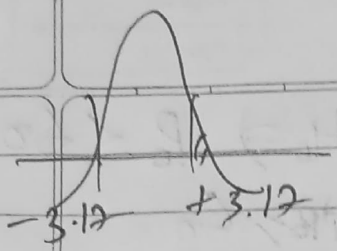
$= \frac{0.2}{0.063}$

$= 3.17$

$3.17 > 1.29$

Reject the Null Hypothesis.

(iv)



p-value
$= 1 - 0.99924$
$= 0.00076$

$\hookrightarrow$ $0.00076 < 0.1$

P_{value} < Significant level

Reject the Null Hypothesis

Q: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

Ans) 99 percentile $\Rightarrow \frac{99}{100} \times 21$

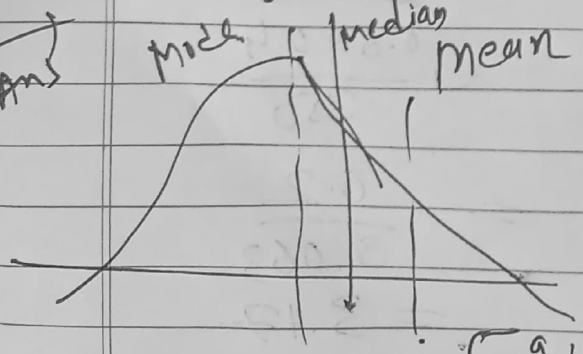
$= 20.79$

$= 21^{th}$ Index

$\hookrightarrow$ 12

Q:5 In left & right skewed data, what is the relationship b/w mean, median & mode, Draw the graph to represent it.

Ans)



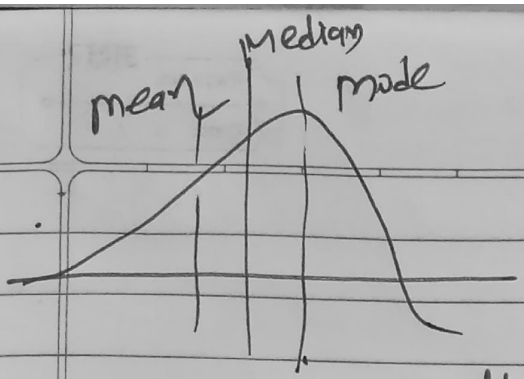
Right skewed.

positive skewed

mean > median > mode

E.g: Wealth Distribution.

(5)



Negative Skew.
(left Skewed)

Mode > median > Mean

↳ life span of human body.