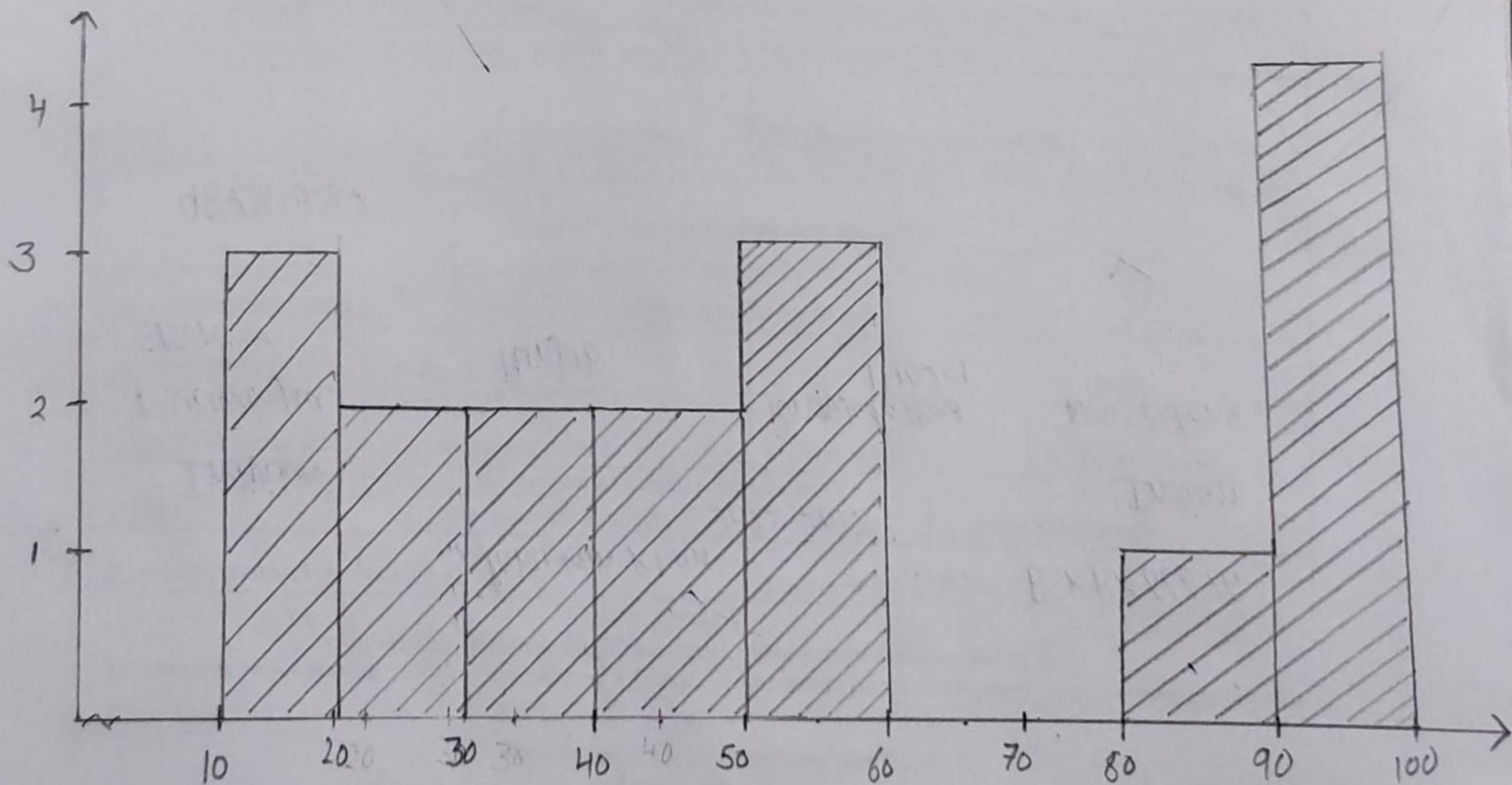


Ques1. Plot a histogram.

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

Bucket	No.
10-20	03
20-30	02
30-40	02
40-50	02
50-60	03
60-70	—
70-80	—
80-90	01
90-100	04



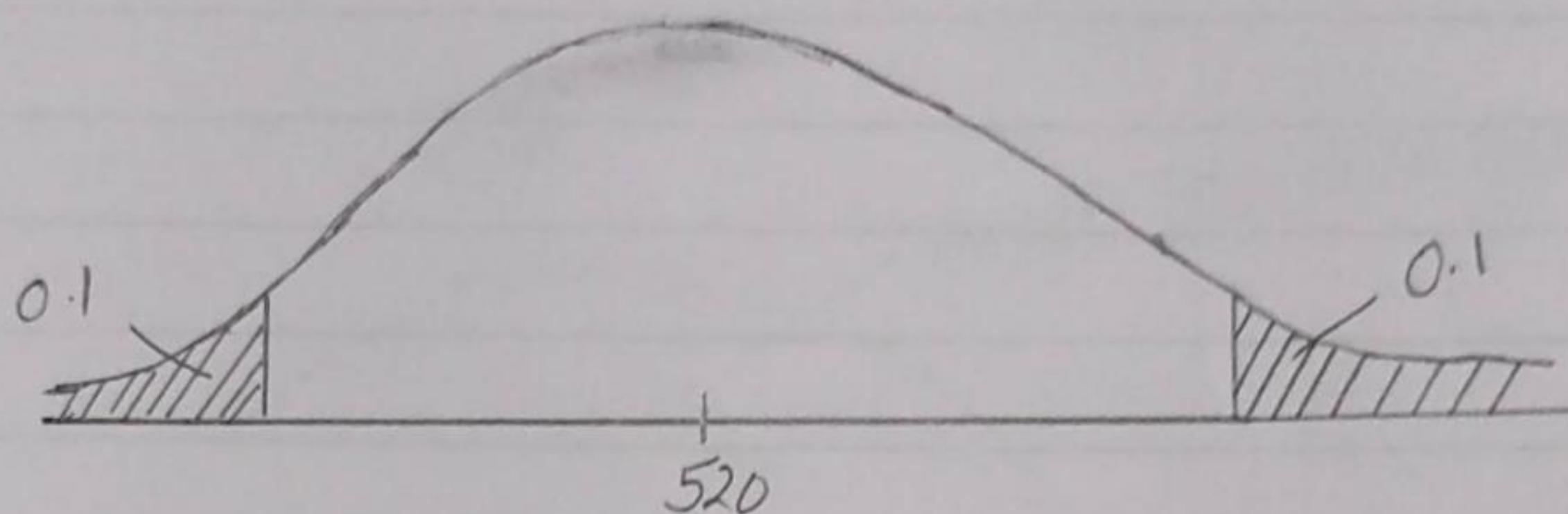
Ques 2. In a quant test of the CAT Exam, the population standard deviation is known to be 100. A sample of 25 tests taken has a mean of 520. Construct and 80% CI about the mean.

Sol

$$\sigma = 100$$

$$n = 25$$

$$\bar{x} = 520$$



Point Estimate \pm Margine of error.

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

α = Significance Value.

$$\begin{aligned} \alpha &= 1 - C.I \\ &= 1 - 0.8 \Rightarrow 0.2 \end{aligned}$$

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

$$Z_{0.2/2} \Rightarrow Z_{0.1} \Rightarrow 0.5398$$

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

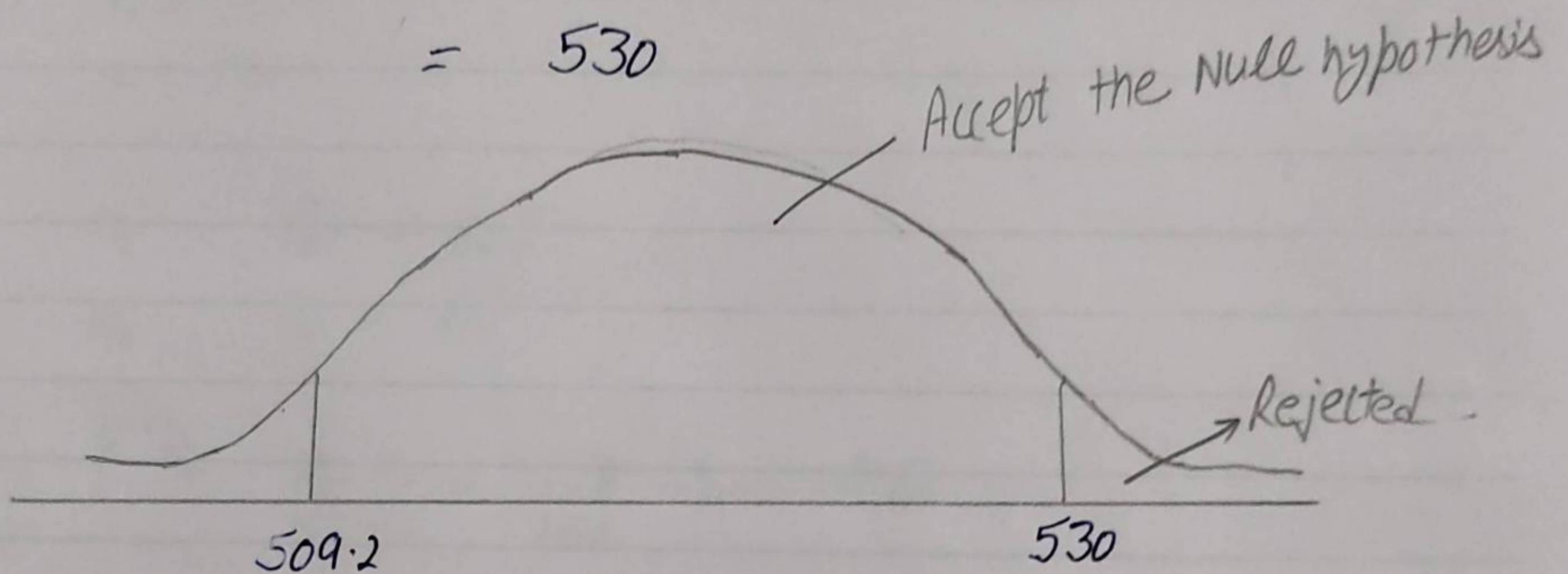
$$520 - 0.398 \times \frac{100}{\sqrt{25}}$$

$$= 509.2$$

$$\text{Higher Fence} = \bar{x} + z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$= 520 + 0.5398 \times \frac{100}{\sqrt{25}}$$

$$= 530$$



Ques 3. A car believes that the percentage of citizens in city ABC that owns a vehicle is 60% or less. A sales manager disagree 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

$$P_0 = 60\%$$

$$n = 250$$

$$x = 170$$

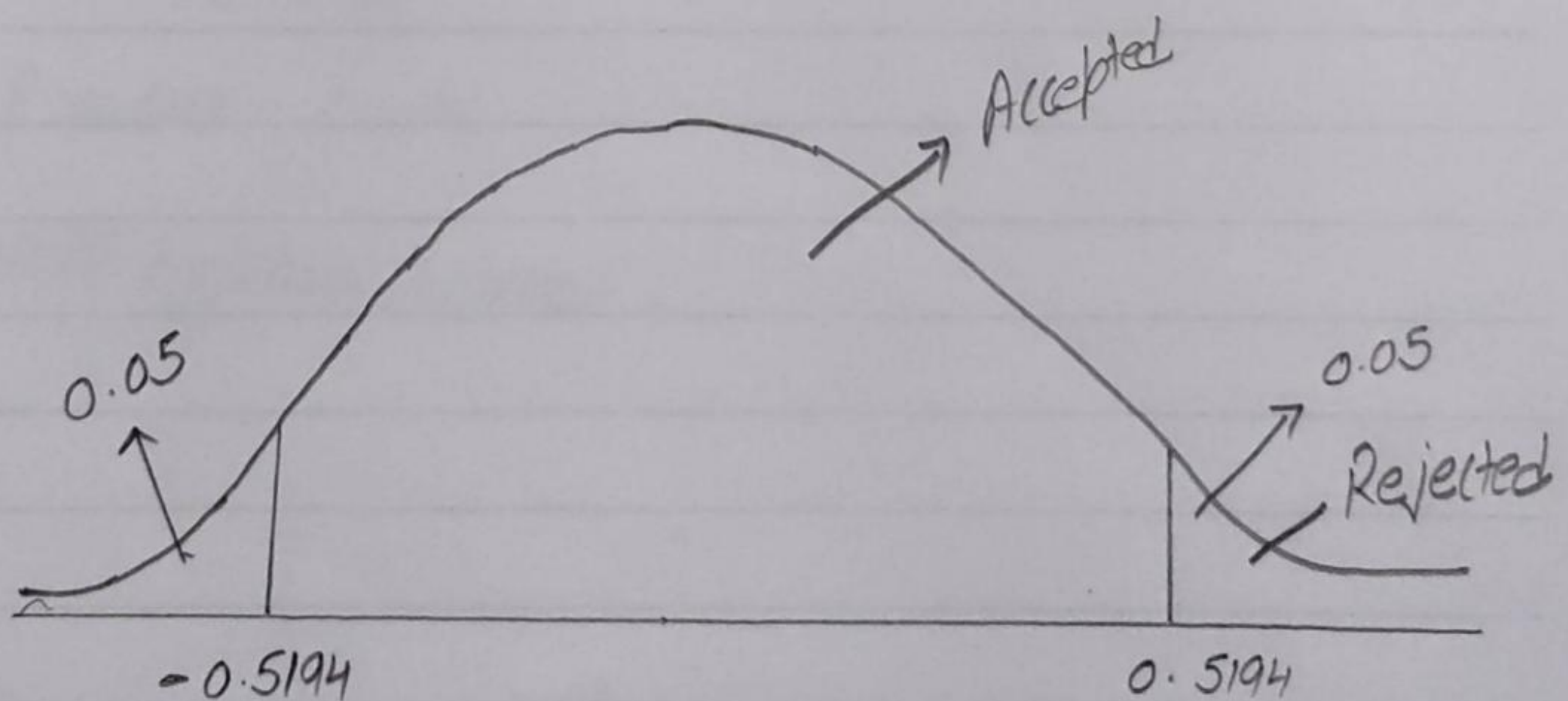
$$H_0 : P_0 = 60\%$$

$$H_0 : P_0 < 60\%$$

$$\hat{p} = \frac{x}{n} = \frac{170}{250} = 0.68$$

$$q_0 = 1 - p_0 = 1 - 0.6 \Rightarrow 0.4$$

$$\alpha = 10\% \Rightarrow 0.1$$



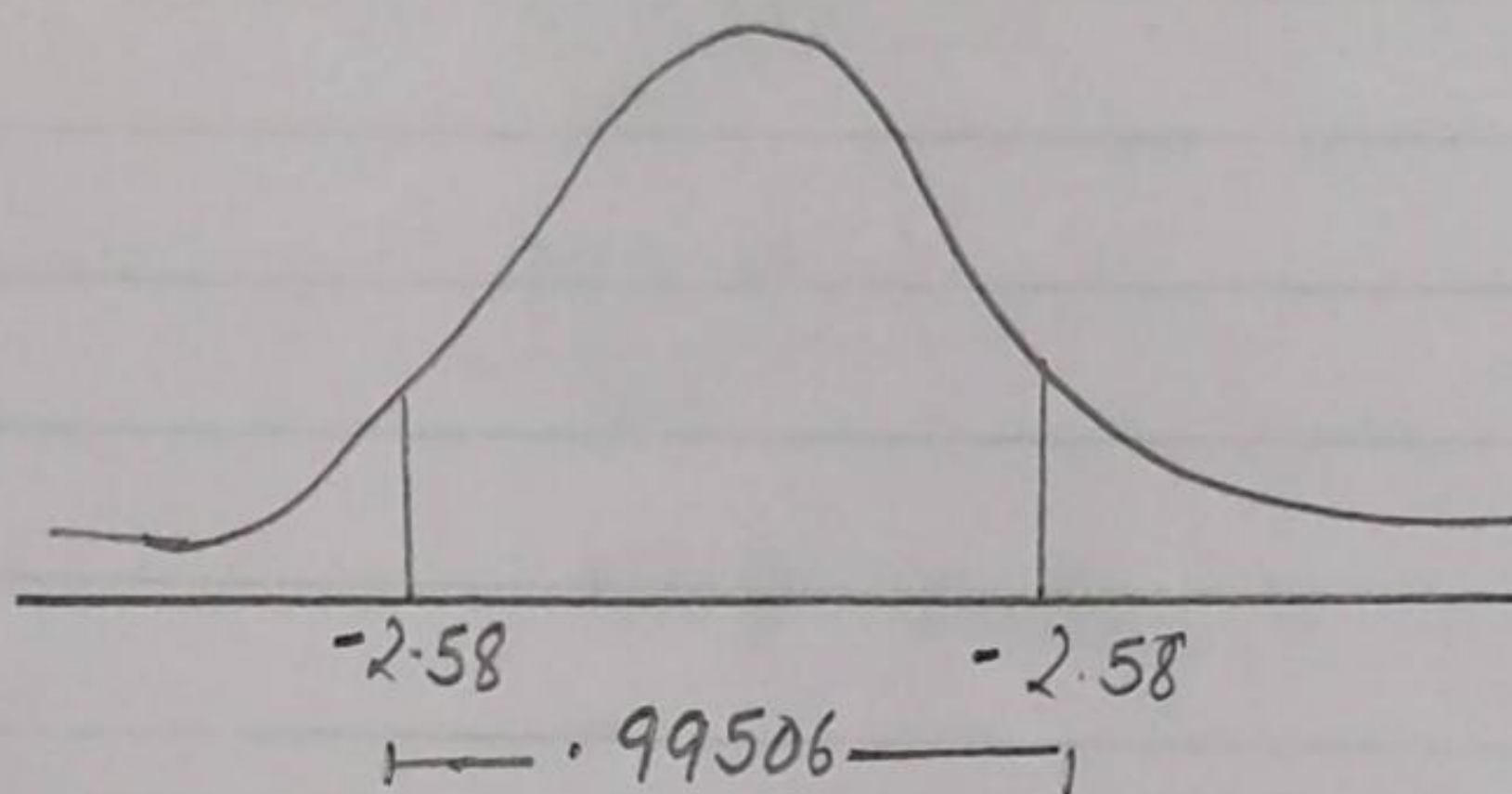
Z-test with proportion

$$Z = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}}$$

$$= \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{250}}} \Rightarrow 2.58$$

$2.58 > 0.5194$ {Reject the Null Hypothesis}

P-value



$$1 - .99506 \\ = 0.005$$

$$\begin{aligned} \text{P-value} &= 0.005 + 0.005 \\ &= 0.01 \end{aligned}$$

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

Null hypothesis rejected.

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

Sol

$$n = 20$$

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

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

$$= \frac{99 \times 19}{100}$$

$$= 18.8 \text{ Index.}$$

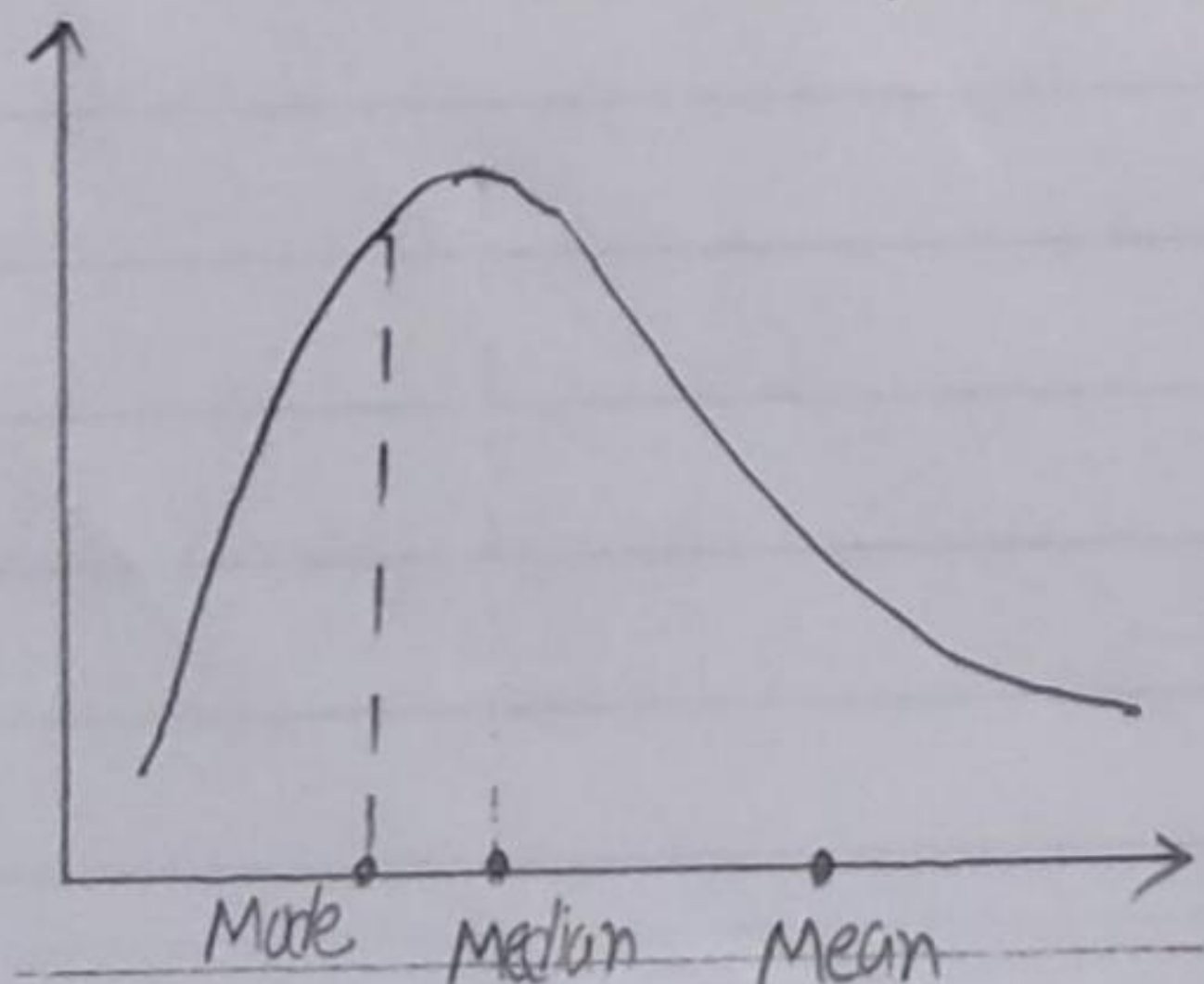
$$\text{Average} = \frac{11+11}{2} \Rightarrow 11$$

Value is 11

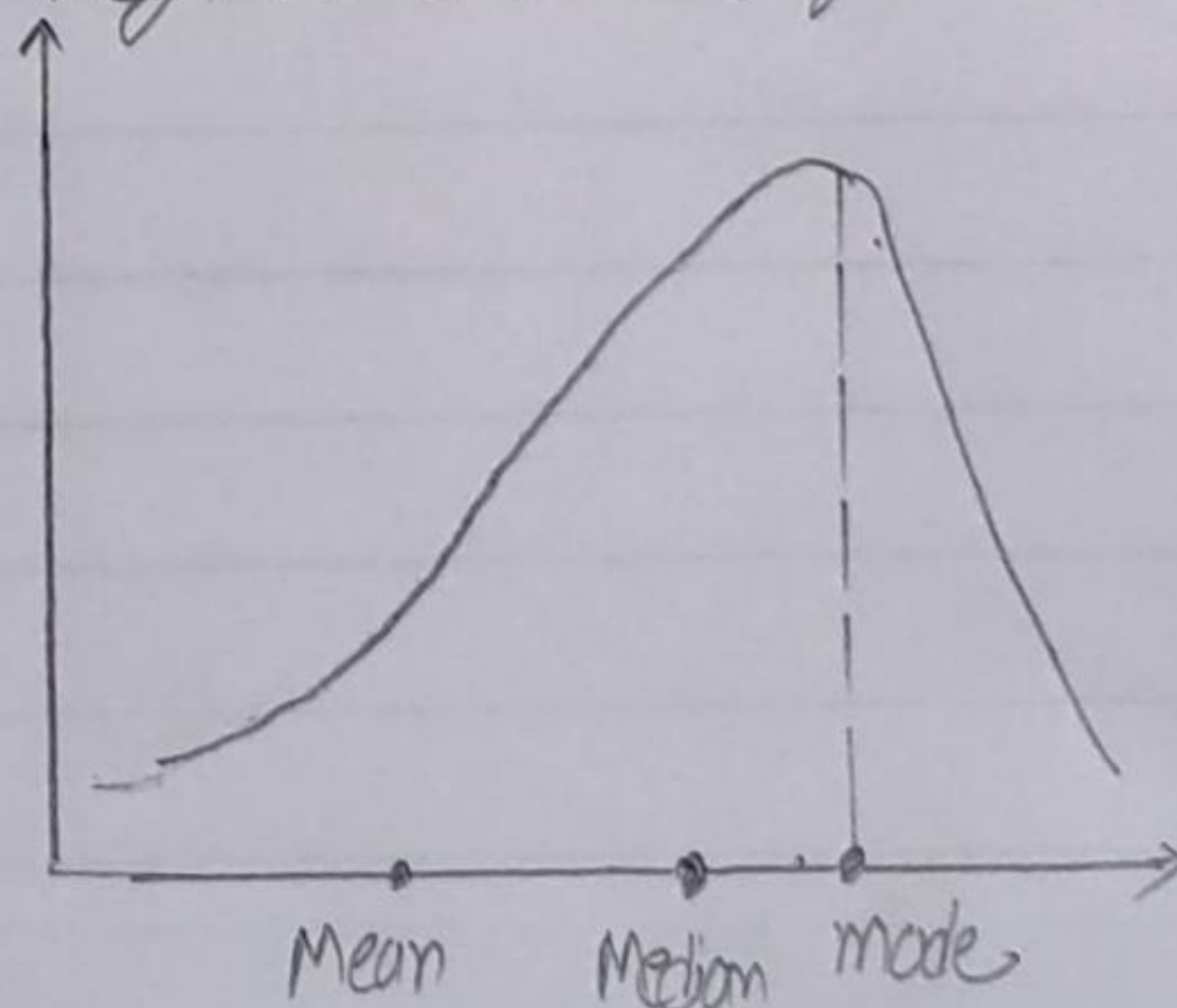
Ques 5. In left & right-skewed data, What is the relationship b/w mean, median & mode?

Draw the graph to represent the same.

Positive skewed (Right-Skewed)



Negative-Skewed (Left-Skewed)



Positive - Skewed
(Right - Skewed)

Mean > median > mode

Negative - Skewed
(Left - Skewed)

Mode > median > mean

Empirical relationship b/w

$$\text{mean} - \text{mode} = 3(\text{mean} - \text{median})$$

or

$$\text{mode} = 3\text{median} - 2\text{mean}$$