

Que 1) Plot a histogram,

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

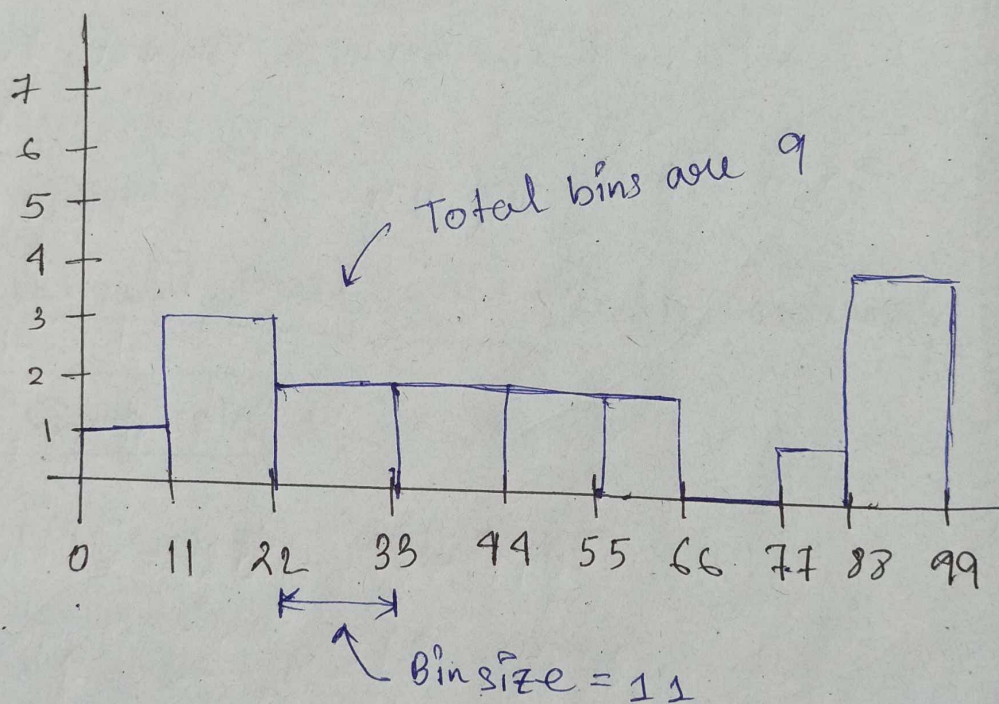
Step 1: sort the number

→ no. are already sorted.

Step 2: let's take bins ~~size~~ = 9

Step 3: define bin size = $\frac{99}{9} = 11$

Step 4: plot histogram



Que 2: In a quant test of the CAT Exam. the population standard deviation is known to be 100. A sample of 25 test taken has a mean of 520. construct an 80% C.I about the mean.

Soln

Given,

population std, $\sigma = 100$ sample, $n = 25$ sample mean, $\bar{x} = 520$

} fails under
 \pm test because
 population std.
 is given.

$$C.I = 80\%$$

$$\text{so, } \alpha = 1 - 0.8 = 0.2$$

constant z-statistic

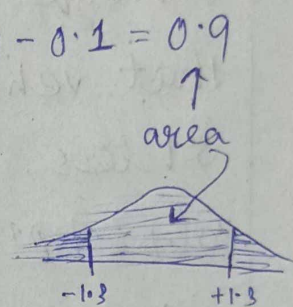
$$\bar{x} \pm z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}} \leftarrow \text{standard error}$$

$$\text{lower Fence} = \bar{x} - z_{\alpha/2} \cdot \frac{\sigma}{\sqrt{n}}$$

$$= 520 - \frac{z_{0.1}}{2} \cdot \frac{100}{\sqrt{25}}$$

$$= 520 - z_{0.1} \cdot 20$$

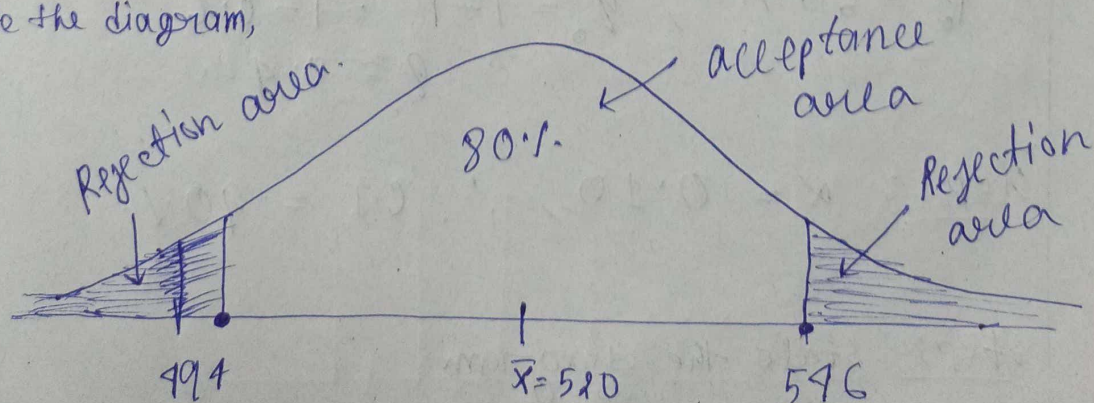
$$= 520 - (1.3) * 20 = 494$$



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

$$= 520 + (1.3) * 20 = 546$$

State the diagram,



Que 3: A car believes that the percentage of citizens in city ABC that owns a vehicle is 60% or less. A sales manager disagrees with this. He conduct 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.) step 1: Define null and alternative hypothesis

$$H_0: p \leq 60\%$$

$$H_1: p \neq 60\%$$

$$\text{given, } n = 250, \quad x = 170$$

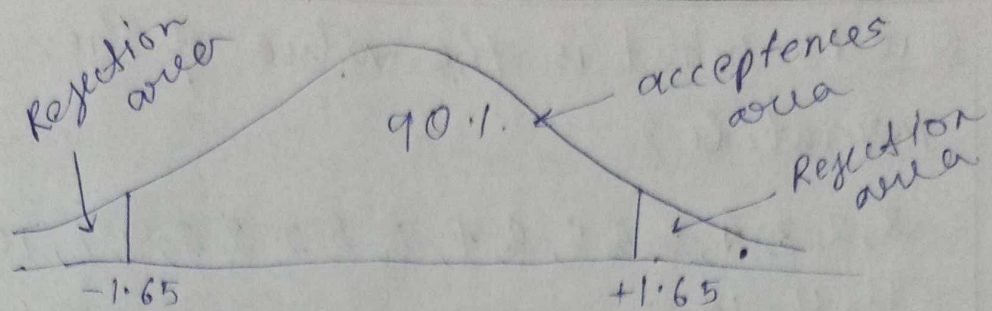
$$\hat{p} = \frac{x}{n} = \frac{170}{250} = 0.68$$

$$p = 60\%, \quad q_0 = 1 - p = 1 - 0.6$$

$$q = 0.4$$

$$\text{step 2: } \alpha = 0.10, \therefore \text{C.I} = 90\%$$

step 3: state the diagram



$$\alpha = 0.10$$

$$\frac{\alpha}{2} = \frac{0.10}{2} = 0.05$$

$$1 - 0.05 = 0.95$$

Z-test with proportion

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

$$= \frac{0.68 - 0.60}{\sqrt{\frac{0.6 \times 0.4}{250}}}$$

$$= \frac{0.08}{0.030} = 2.59$$

$1.59 > 1.65$ } Reject the null hypothesis

conclusion: The city ABC has more than 60% citizens who own vehicles.

Que 4: What is the value of the 99 percentile?

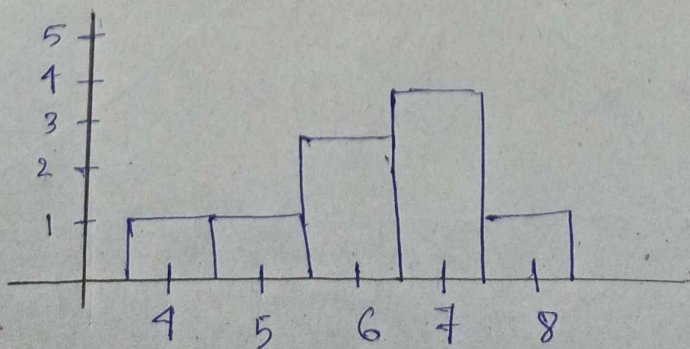
2, 2, 3, 4, 5, 5, 5, 6, 7, 8, 8, 8, 8, 8, 9, 9, 10, 11, 11, 12

$$\begin{aligned}\text{value of 99 percentile} &= \frac{99}{100} \times (20 + 1) \\ &= \frac{99}{100} \times 21 \\ &= 20.79\end{aligned}$$

Ans → The value of 99 percentile is 12.

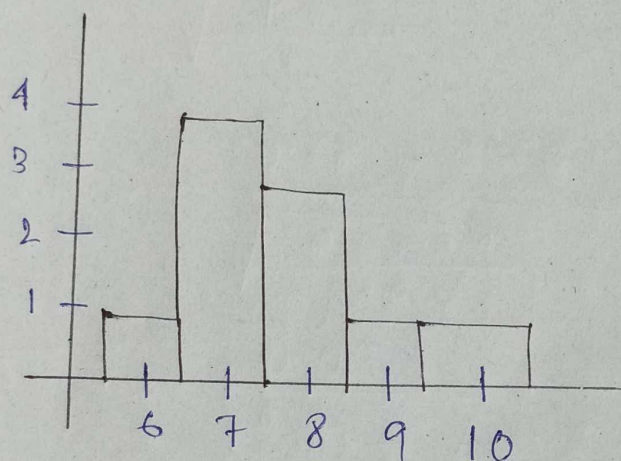
Que 5: In the left & right-skewed data, what is the relationship between mean, median & mode? Draw the graph to represent the same?

Sol, The histogram for data: 4, 5, 6, 6, 6, 7, 7, 7, 7, 8 is not symmetrical. The right-hand side seems "chopped off" compared to the left side. A distribution of this type is called skewed to the left because it is pulled out to the left.



The mean is 6.3, the median is 6.5, and the mode is 7. Notice that the mean is less than the median, and they are both less than the mode. The mean and the median both reflect the skewing, but the mean reflects it more.

The histogram for the data: 6, 7, 7, 7, 7, 8, 8, 8, 9, 10 is also not symmetrical. It is skewed to the right.



The mean is 7.7, the median is 7.5, and the mode is 7. Of the three statistics, the mean is the largest, while the mode is the smallest. Again, the mean reflects the skewing the most.

