

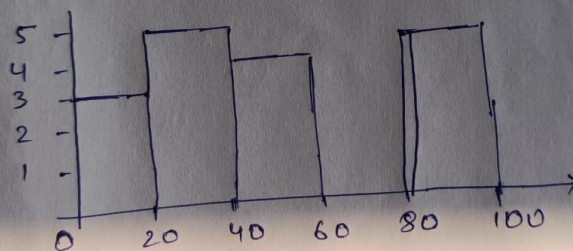
Neuron Statistics Assignment

Example

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

Bin = 5

Bin Size = 20.



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Using 5 number summary, ...

Q) 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

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$$\text{Value} = \frac{\text{Percentile} \times n}{100}$$

$$= \frac{99 \times 20}{100} = \frac{99}{5} = 19.8 \text{ (index) } \rightarrow \text{between 11 or 12.}$$

$$\text{Index} = \frac{11 + 12}{2} = \frac{23}{2} = 11.5 \text{ index}$$

∴ 8 is my 99 percentile

Q. On the quant test of CAT exam

On the 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% CI about the mean?

Ans

Now, $n=25$
 $\bar{x}=520$

$SD=100=S$

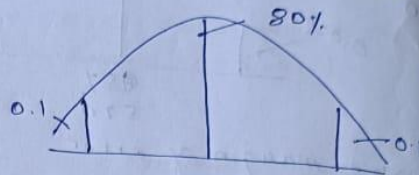
$CI=80\%$ $\sigma=100$

Let d = significant value

Conf = $1 - CI$

sig = $1 - 80$

$1 - 0.8 = 0.2$



Since here population standard deviation is given we will use z test.

So Lower / Higher fence =

Point estimate \pm margin of error

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

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

In z score table we have to find

$$1 - 0.1 = 0.9$$

$$= 520 - Z_{0.1} \frac{\sigma}{\sqrt{n}}$$

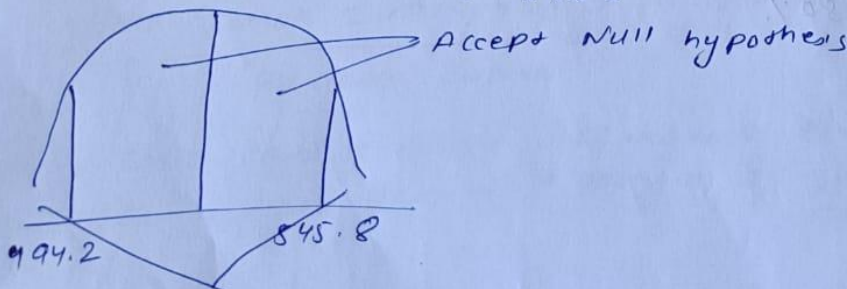
$$= 520 - 1.29 \times \frac{100}{\sqrt{25}}$$

$$520 - 1.29 \times \frac{100}{5} = 520 - 25.8 = 494.2$$

$$\text{Higher fence} = 520 + Z_{0.1} \frac{\sigma}{\sqrt{n}}$$

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

$$= 520 + 25.8 = 545.8$$



Reject null hypothesis

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P-value > significant value \rightarrow Accept the null hypothesis.

Q) A car company believes that the percentage of accidents 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 and found that 170 responded yes to owning a vehicle.

(a) state the Null or Alternate hypothesis

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

Null hypothesis = $H_0: P_0 \geq 60\%$
 $H_1: P_1 < 60\%$

$n = 250$ $x = 170$

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

② P_0 $q_0 = 1 - P_0 = 1 - 0.6 = 0.4$

③ $\alpha = 10\% = 0.1$ ($\alpha = 1 - 0.9 = 0.1$) 10% significance value

$$z_{test} = \frac{\hat{P} - P_0}{\sqrt{\frac{P_0 q_0}{n}}} = \frac{0.68 - 0.6}{\sqrt{\frac{0.6 \times 0.4}{250}}} = \frac{0.08}{0.030} = 2.66$$

~~$\alpha = 0.9$~~

~~$z_{\alpha/2} = z_{0.9/2} = z_{0.45}$~~

~~In z score table $1 - 0.45 = 0.55 = 0.13$~~

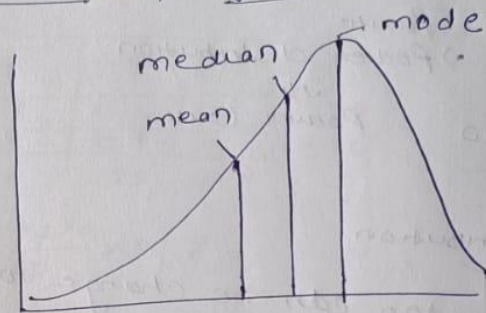
Since $2.66 > 1.28$

reject H_0 (Null hypothesis)

which means vehicle owners are less than 60%.

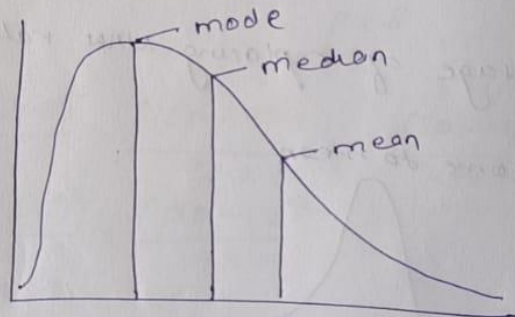
Q) In left & Right skewed data, what is the relationship between mean, median, mode.
Draw the graph to represent the same.

Ans. In left skewed / Negative skew



Here in left skew
 $\text{mean} < \text{median} < \text{mode}$

Right skew / Positive skewness



Here in Right skew
 $\text{mean} > \text{median} > \text{mode}$