

4

Saturday

19th June 2022

JANUARY 2020

Week - 1 (004-362)

Assignment

Appointments

①

Histogram

8

eg = {10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 98, 99}

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bins = 5
binsize = 20

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freq

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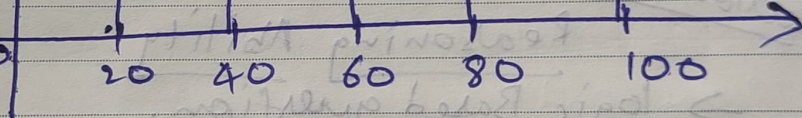
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Sunday

Week - 1 (005-561)

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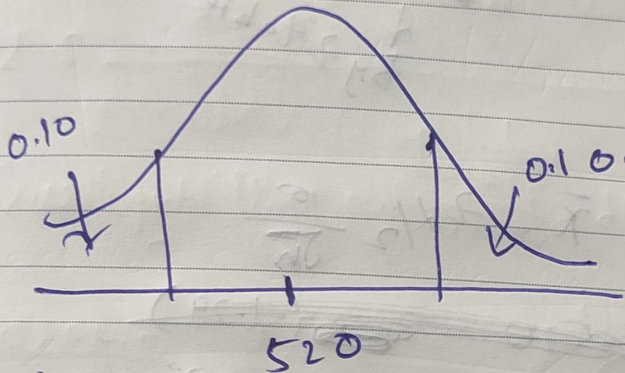
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Appointments

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 an 80% C.I about the mean.

Sol. $\sigma = 100$ $\bar{x} = 520$ $n = 25$ $C.I = 80\%$



$$\begin{aligned}\alpha &= 1 - C.I \\ &= 1 - 80\% \\ &= 0.20\end{aligned}$$

Sunday

Parameter = Point estimate \pm margining error

$$\downarrow$$

$$\bar{x}$$

$$\pm z_{\alpha/2} \boxed{\frac{\sigma}{\sqrt{n}}}$$

standard error

$$= 520 \pm z_{0.20/2} \frac{100}{\sqrt{25}}$$

$$= 520 \pm z_{0.10} \frac{100}{5}$$

$$= 520 \pm z_{0.10} (20)$$

$$\alpha = 1 - 0.9 = 0.10$$

$$\alpha = 1 - 0.90 = 0.10$$

Appointments

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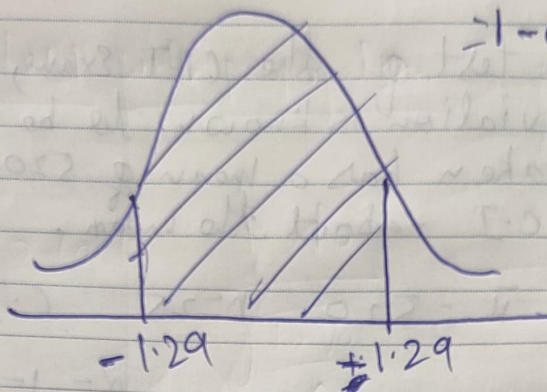
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↓
By z-table

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

~~$$= 520 - 1.29 \left(\frac{100}{\sqrt{25}} \right)$$~~

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

$$= 520 - (1.29) \frac{100}{5}$$

$$= 494.2$$

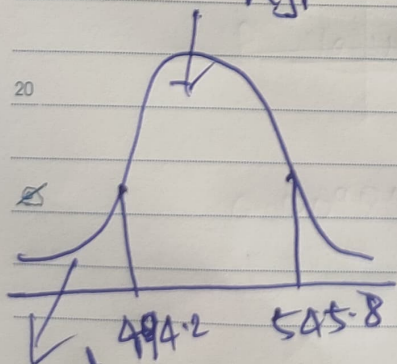
$$\text{Higher fence} = \bar{x} + z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

Accept the Null Hypothesis

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

$$= 520 + (1.29) \cdot 20$$

$$= 545.8$$



Reject
the
Null hypothesis

Appointments

3) A car believes that the % of citizens in city ABC that owns a vehicle is 60% or less. A sales manager disagrees with this. He conducted a hypothesis testing surveying 250 residents & found that 170 residents yes to owning a vehicle.

- state the null & alternate hypothesis.
- At a 10% significance level, is there enough evidence to support the idea that vehicle owners in ABC city is 60% or less.

sol.

$$n = 250 \quad x = 170 \quad \alpha = 10\%$$

~~$$H_0: \mu = 60$$~~

$H_0: \mu > 60 \rightarrow$ Null hypothesis

~~$$H_1: \mu < 60$$~~

$H_1: \mu \leq 60 \rightarrow$ Alternative Hypothesis

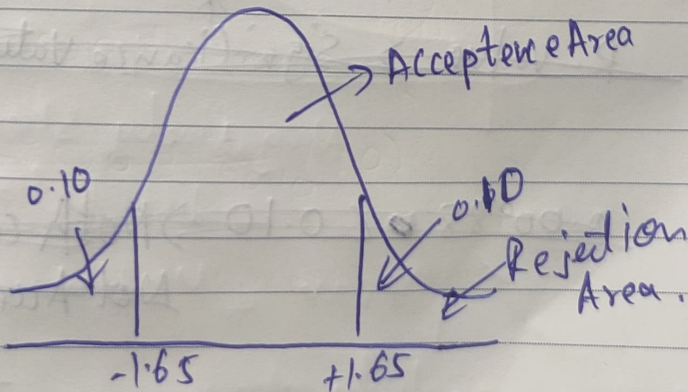
$$\hat{p} = \frac{x}{n} = \frac{170}{250} = 0.68$$

$$q_0 = 1 - p_0 = 1 - 0.60 = 0.40$$

2) $\alpha = 0.1$

$$1 - 0.05 = 0.95 = 1.65 \text{ (as per z table)}$$

3)

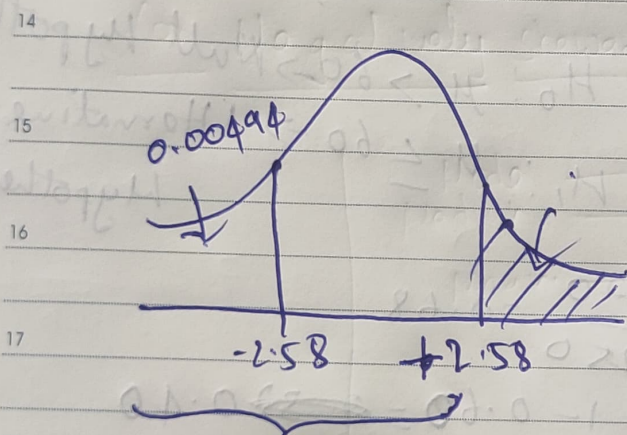


Appointments

8 * z-test with propagation

$$9 \quad z \text{ test} = \frac{\hat{p} - p_0}{\sqrt{\frac{p_0 q_0}{n}}} = \frac{0.68 - 0.60}{\sqrt{\frac{0.60(0.4)}{250}}} \\ 10 \\ 11 \\ 12 \quad = \frac{0.08}{\sqrt{\frac{0.24}{250}}} = 2.58$$

13 $2.58 > 1.96$ ~~not~~ ^{Reject} ~~the~~ ^{the Null Hypothesis}



$$2.58 = 0.99506$$

↓
As per z-table.

$$1 - 0.99506 = 0.00494$$

$$P \text{ value} = 0.00494 + 0.00494 \\ = 0.00988$$

18 ~~0.99506~~
0.99506

19 ~~P value > Significance value~~ → ~~Accept the~~
Null Hypothesis

20 ~~0.00988 < 0.10~~ → ~~Not Accept the~~
~~Null Hypothesis~~

Appointments

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

$0.00988 < 0.10 \rightarrow$ Hence Reject the Null hypothesis

④ what is the value of the 99 percentile?

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

Sol.

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

$N=20$

$$= \frac{99}{100} \times 20 = \frac{99}{5} = 19.8 \approx 20$$

99 percentile = 12 (as per dataset given)

⑤ In left & right-skewed data, what is the relation ship B/w mean, median & mode?

Draw the graph to represent the same.

Ans:- for positively skewed freq distribution:-

In case of a positively skewed freq distribution, the mean is greater than median and the median is always greater than the mode.

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

Appointments

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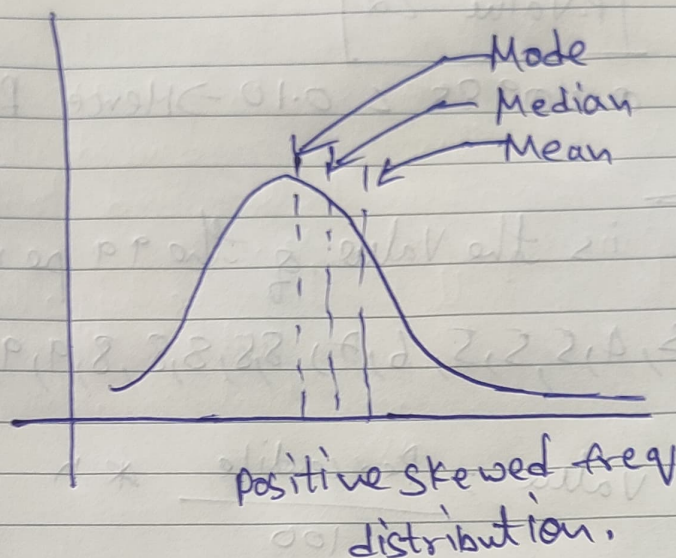
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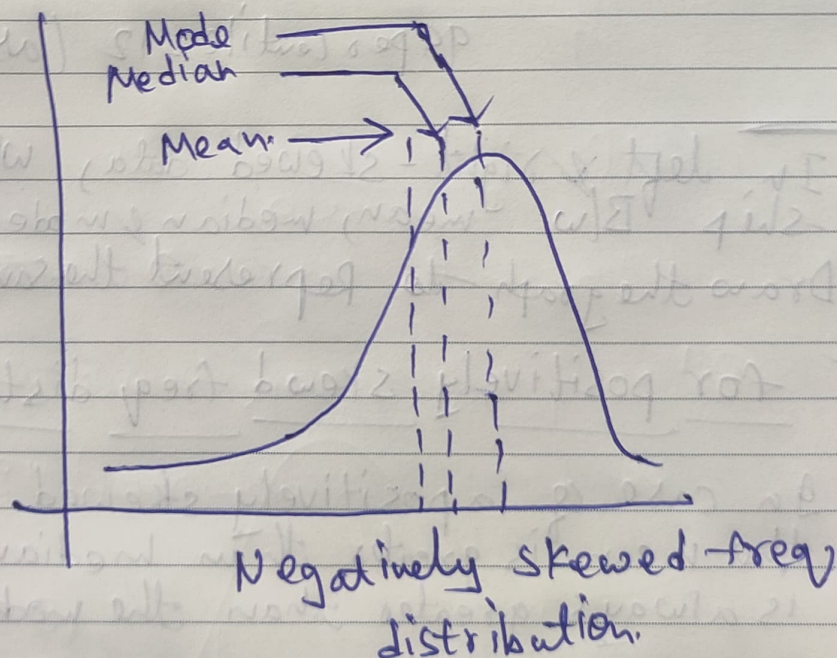
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for Negatively skewed freq distribution:-



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

In case of a negatively skewed freq distribution, the mean is always lesser than median and the median is always

lesser than the mode.

For every minute you remain angry, you give up sixty seconds of peace of mind - Ralph Waldo Emerson