STATISTICS ASSIGNMENT

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ANSWERS

Ans(1) Steps to construct a Histogram.

(a) Sort the dataset in Ascending Order,

{10, 13, 18, 22, 27, 32, 38, 40, 45, 51, 56, 57, 88, 90, 92, 94, 95}

(b) Deciding the Bins.

From this dataset let's take the Bins (Groups) as 10.

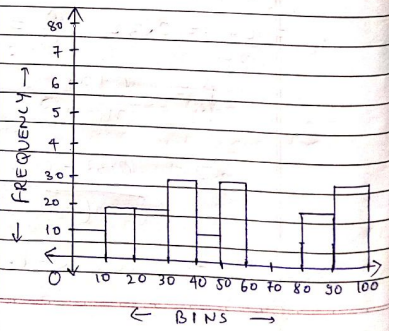
(c) Declaring the Bin Size.

So, from this data set, we can see that our values are ranging from 0-100.
So,

$$\text{Bin Size} = \left(100/10\right) = 10$$

(d) Let's Construct the Histogram.

BINS	FREQUENCY
0-10	1
10-20	2
20-30	2
30-40	3
40-50	1
50-60	3
60-70	0
70-80	0
80-90	2
90-100	3



Ans (2) Given Values are :-

(1) Population Standard Deviation $(\sigma) = 100$
(2) Sample Size $(n) = 25$
(3) Mean of the sample $(\bar{x}) = 520$
(4) Significance Value $(\alpha) = 1 - \frac{80}{100}$

$$\alpha = 1 - 0.8$$
$$\boxed{\alpha = 0.2}$$

∵ We are given Population Standard Deviation we will use Z-score table.

⇒ Finding the values of C.I :

∴ Higher Fence $= \bar{x} + Z_{\frac{\alpha}{2}} \left(\frac{\sigma}{\sqrt{n}} \right)$

$= 520 + Z_{\frac{0.2}{2}} \left(\frac{100}{\sqrt{25}} \right)$

$= 520 + Z_{0.1} (20)$

↳ For, this we need to find $= 1 - 0.1 = 0.9$ in the z-score table.
Thus, we get the value as 1.3

Higher Fence $= 520 + (1.3)(20)$
Higher Fence $= 546$

∴ Lower Fence $= \bar{x} - Z_{\frac{\alpha}{2}} \left(\sigma / \sqrt{n} \right)$

Lower Fence $= 520 - (1.3)(20)$
Lower Fence $= 494$

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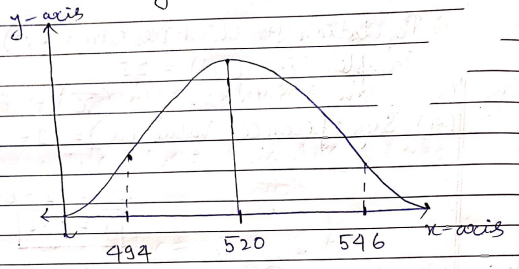
⇒ So, constructing the graph:



⇒ CONCLUSION :- All our values if ranging between 494-546, will be accepted and others will be rejected and this is 80% CI about the mean.

Ans 5) (a) Null Hypothesis (H_0) > 60% people owning vehicle.

Alternate Hypothesis (H_1) ≤ 60% people owning vehicle.

(b) Given Values are:

$\alpha = 0.1$ $n = 250$ $p_0 = 0.60$

→ It is a situation, where we have to test z-test with proportions.

So, proportion $(\hat{p})$ = $\frac{\text{People Responded Yes}(x)}{\text{Total People}(n)}$

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

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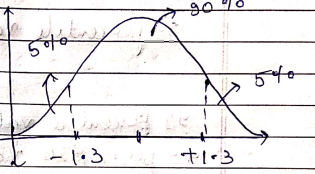
$\Rightarrow$ $q_0 = 1 - p_0 = 1 - 0.68 = \boxed{0.32 = q_0}$

$\because$ $\alpha = 0.1$, so, from z-table we will look for

$Z_{0.9} = 1.3$

So, this means,

Thus, values are accepted 1.3 standard deviation to the left and right of mean.



$\Rightarrow$ Now, applying the formula:

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

$$Z_{test} = \frac{0.68 - 0.60}{\sqrt{\frac{(0.68)(0.32)}{250}}}$$

$$Z_{test} = \frac{0.080}{0.0295} = 2.711$$

So, this value is lying outside our range of -1.3 to 1.3,

thus the NULL HYPOTHESIS IS REJECTED, which means that the people owning a vehicle is less than 60%.

Q6(4) The given data is:

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

Now, Calculating 99 percentile:

$$\text{99 percentile value} = \frac{\text{Percentile}}{100} \times (n+1)$$

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

$$= \frac{99}{100} \times 21$$

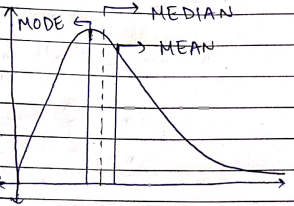
$$= 20.79$$

$$\simeq 20^{th} \text{ Index Position.}$$

Thus, 12 is our 99 percentile value, as it is at 20^{th} Index.

Ans(5) Relationship between Mean, Mode and Median in left and Right Skewed Data.

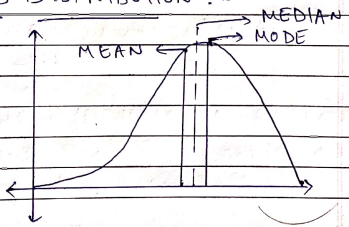
⇒ RIGHT SKEWED DISTRIBUTION :-



Thus, from the graph, we can say that

MEAN > MEDIAN > MODE

⇒ LEFT SKEWED DISTRIBUTION :-



Thus, from the graph we can say that

MEAN < MEDIAN < MODE