

Page _____

1) Why is the Denominator of Sample Variance is " $(n-1)$ " not " n "?

= In most of the cases population mean is not known, and has to be replaced by Sample Variance mean which adds to the variability of the estimate of the variance. It will be compensated if we use " $n-1$ " instead of " N " in the denominator to get the unbiased estimate of the population variance.

If we know the population mean, then we can use " N " in the denominator to get the unbiased estimate of the population variance.

$$\text{Population Variance, } \sigma^2 = \frac{\sum_{i=1}^N (x_i - \mu)^2}{N}$$

$$\text{Sample Variance, } s^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{(n-1)}$$

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2) What is the difference between mean, median & mode Right Skewed & left Skewed graph.

Left

= Right Skewed

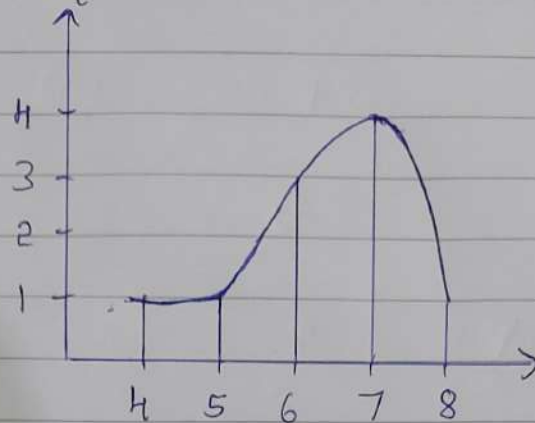
"Mean" is less than "Median" and they both are less than "Mode".

Right ~~Left~~ Skewed.

"Mode" is less than "Median" and they both are less than "Mean".

Example: Left skewed.

Data = {4 5 6 6 6 7 7 7 7 8}



$$\text{Mean} = \frac{(4+5+6+6+6+7+7+7+7+8)}{10} = \frac{63}{10} = 6.3$$

$$\text{Mean} = \underline{6.3}$$

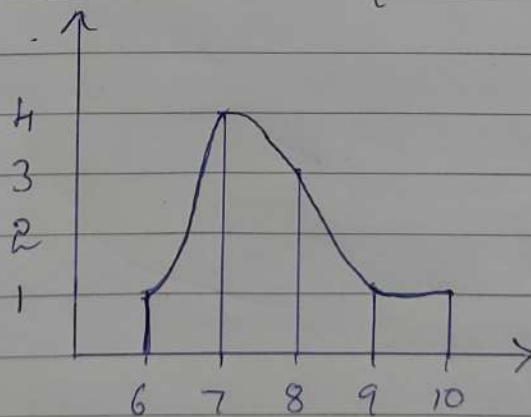
$$\text{Mode} = \underline{7}$$

$$\text{Median} = \frac{6+7}{2} = \frac{13}{2}$$

$$\text{Median} = \underline{6.5}$$

Conclusion: "Mean" is lesser than Median & they both are lesser than Mode.

Right skewed: Data = {6 7 7 7 7 8 8 8 9 10}



$$\text{Mean} = \frac{6+7+7+7+7+8+8+8+9+10}{10} = \frac{77}{10}$$

$$= \underline{7.7}$$

$$\text{Median} = \frac{7+8}{2} = \frac{15}{2} = 7.5 \quad \text{Mode} = \underline{7}$$

Conclusion: "Mode" is lesser than Median & they both are lesser than Mean.