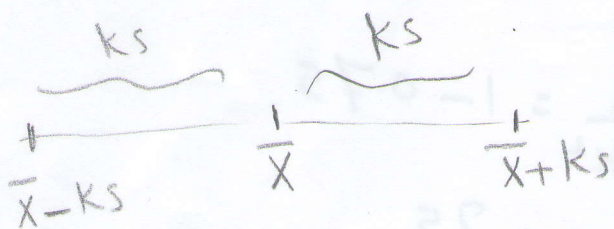


Chebyshev inequality:-

Theorem:-

If we have a sample with mean \bar{x} and standard deviation s , then the percentage of data in the interval $(\bar{x} - ks, \bar{x} + ks)$ not less than $(1 - \frac{1}{k^2})$, $k > 1$



Example 1:-

If we have a sample with mean $\bar{x} = 7$ and standard deviation $s = 5$.

What is the percentage of data in the interval $(-4, 18)$

Solution:-

$$(\bar{x} - ks, \bar{x} + ks) = (-4, 18) \Rightarrow \bar{x} + ks = 18$$
$$7 + 5k = 18$$
$$5k = 11$$

$$k = \frac{11}{5}$$

$$1 - \frac{1}{k^2} = 1 - \frac{1}{(\frac{11}{5})^2} \Rightarrow 1 - \frac{1}{k^2} = 0.7934$$

Then The Percentage of data is
79.34%

Example:-

If we have a sample with mean $\bar{X} = 7$
and standard deviation $s = 5$

Find the interval the data not less than
75%

$$1 - \frac{1}{k^2} = 0.75 \Rightarrow \frac{1}{k^2} = 1 - 0.75$$

$$\frac{1}{k^2} = 0.25$$

$$\Rightarrow k^2 = \frac{1}{0.25}$$

$$\Rightarrow k = \sqrt{\frac{1}{0.25}}$$

$$\Rightarrow k = 2$$

$$(\bar{x} - ks, \bar{x} + ks) = (7 - 2 \times 5, 7 + 2 \times 5)$$

$$= (7 - 10, 7 + 10)$$

$$= (-3, 17)$$