problem : 3

From the following data find out which product is more stable prices.

prices of product A (Rs)	20	22	19	23	16
prices of product B (Rs)	10	20	18	12	15

Solution:

Assume product A as 'x',
product B as 'y'.

$\bar{x}_A = \frac{100}{5} = 20$; $\bar{y}_B = \frac{75}{5} = 15$

x	$x-\bar{x}$ where $\bar{x}=20$	$(x-\bar{x})^2$	y	$y-\bar{y}$ where $\bar{y}=15$	$(y-\bar{y})^2$
20	0	0	10	−5	25
22	+2	4	20	5	25
19	−1	1	18	3	9
23	3	9	12	−3	9
16	−4	16	15	0	0
		$\Sigma(x-\bar{x})^2 = 30$			$\Sigma(y-\bar{y})^2 = 68$

For x :

$$\sigma_x = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n}} = \sqrt{\frac{30}{5}} = \sqrt{6}$$

$$\boxed{\sigma_x = 2.449}$$

$$C.V = \frac{\sigma_x}{\bar{x}_A} \times 100$$

$$= \frac{2.449}{20} \times 100 = 12.245$$

$$\boxed{\text{Coefficient of variation} = 12.245}$$

For y : $\sigma_y = \sqrt{\frac{\Sigma(y-\bar{y})^2}{n}} = \sqrt{\frac{68}{5}} = \sqrt{13.6}$

$$\therefore \sigma_y = 3.687$$

$$C.V = \frac{\sigma_y}{\bar{y}_B} \times 100 = \frac{3.687}{15} \times 100 = 24.58$$

$$\boxed{\text{Coefficient of variation} = 24.58}$$

∴ product B is more stable prices than product A.

4) Calculate the coefficient of variation for the following data.

Size of item	3.5	4.5	5.5	6.5	7.5	8.5	9.5
Frequency	3	7	22	60	85	32	8

Solution :

$x \longrightarrow$ Size of item

$f \longrightarrow$ Frequency

x	f	$d = x - A$, $A = 6.5$	fd	fd^2
3.5	3	−3	−9	27
4.5	7	−2	−14	28
5.5	22	−1	−22	44
6.5	60	0	0	0
7.5	85	1	85	85
8.5	32	2	64	128
9.5	8	3	24	72
	N=217	0	128	362

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8.5	32	2	64	128
9.5	8	3	24	72
	N=217	0	128	362

$$\text{Mean, } \bar{x} = A + \frac{\sum fd}{N}$$

$$= 6.5 + \frac{128}{217}$$

$$= 7.0899$$

$$\boxed{\bar{x} = 7.0899}$$

Since mean is in fraction, we use the following formula to calculate S.D.

$$\sigma = \sqrt{\frac{\sum fd^2}{N} - \left[\frac{\sum fd}{N}\right]^2}$$

$$= \sqrt{\frac{362}{217} - \left[\frac{128}{217}\right]^2}$$

$$= \sqrt{1.668 - [0.589]^2}$$

$$= \sqrt{1.668 - 0.346}$$

$$= \sqrt{1.322} \quad = 1.1490$$

$$\boxed{\text{Standard deviation, } \sigma = 1.1490}$$

$$\text{Coefficient of variation} = \frac{\sigma}{\bar{x}} \times 100$$

$$= \frac{1.1490}{7.0899} \times 100$$

$$= 16.2062$$

$$\boxed{\text{Coefficient of variation} = 16.2062}$$