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DPP-4 Maths - IV Unit - 3

Topic- Skewness

Q-1- (i) Define skewness of a distribution.

Ans- Skewness means lack of symmetry in frequency distribution.

a) Mean = Median = Mode — No Skewness

b) Mean > Mode — Positively skewed

c) Mean < Mode — Negatively skewed

ii) Define the coefficients of skewness.

Ans- Relative measures of skewness are called coefficient of skewness.

$$SK_p = \frac{\text{Mean} - \text{Mode}}{SD}$$

$SK_p = 0$ — Symmetrical

$SK_p > 0$ — Positively skewed

$SK_p < 0$ — Negatively skewed

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Q-2- Karl Pearson's coefficient of skewness of a distribution is 0.32, its standard deviation is 6.5 and mean is 29.6. Find the mode of the distribut

Ans-2- Mean $(\bar{x}) = 29.6$

Standard deviation $= 6.5$

$S_{KP} = 0.32$

$$S_{KP} = \frac{\text{Mean} - \text{Mode}}{SD}$$

$$0.32 = \frac{29.6 - \text{Mode}}{6.5}$$

$$29.6 - \text{Mode} = 6.5 \times 0.32$$

$$29.6 - \text{Mode} = 2.08$$

$$\text{Mode} = 29.6 - 2.08$$

$$\boxed{\text{Mode} = 27.52}$$

Q-3 The first three central moments of a distribution are 0, 2.5, 0.7. Find the value of the moment coefficient of skewness.

$\mu_1 = 0$, $\mu_2 = 2.5$, $\mu_3 = 0.7$

$$SK_M = \frac{\mu_3}{\sqrt{\mu_2^3}} = \frac{0.7}{\sqrt{15.625}} = \frac{0.7}{3.95}$$

$\boxed{SK_M = 0.177}$ positively skewed

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Q-4- In a certain distribution, the first four moments about the point 4 are -1·5, 17, -30 and 308. Calculate the moment coefficient of skewness.

Ans-4 - $A=4$, $\mu_1' = -1.5$, $\mu_2' = 17$, $\mu_3' = -30$

$$\mu_2 = \mu_2' - (\mu_1')^2$$

$$\mu_2 = 17 - 2.25$$

$$\boxed{\mu_2 = 14.75}$$

$$\mu_3 = \mu_3' - 3\mu_2'\mu_1' + 2\mu_1^3$$

$$= -30 - 3 \times 17 \times (-1.5) + 2 \times (-3.375)$$

$$= -30 + 76.5 - 6.75$$

$$\boxed{\mu_3 = 39.75}$$

$$SK_M = \frac{\mu_3}{\sqrt{\mu_2^3}} = \frac{39.75}{\sqrt{3209.04}}$$

$$= \frac{39.75}{56.64}$$

$$\boxed{SK_M = 0.7018}$$ positively skewed

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