Name : M. Daud

I'D : 7769

Mid term assignment no 1

Subject : Probability and Statistics

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Q No 1:

Sol:

A/x	B/y	C/z	x^2	y^2	z^2
12	3	5	144	9	25
15	13	14	225	169	196
6	43	36	36	2401	1296
73	102	105	5329	10404	11025
7	175	99	49	30625	9801
9	220	20	361	48400	98400
199	204	15	39601	41616	225
36	139	96	1296	19321	9216
84	69	13	7056	4761	169
65	30	45	4225	900	2025
Σ 516	998	448	58322	158606	34,378

a) Better run getter.

Arthimetic mean of Batsman A

$$\bar{x}_A = \frac{\Sigma x}{n}$$

$$= \frac{516}{10}$$

$$\bar{x}_A = 51.6$$

→ Arthimatic mean of Batsman B

$$\bar{x}_B = \frac{\Sigma x}{n}$$

$$\bar{x}_B = \frac{998}{10}$$

$$\bar{x}_B = 99.8$$

→ Arthimetic mean of Batsman C

$$\bar{x}_c = \frac{\Sigma x}{n}$$

$$= \frac{448}{10}$$

$$= 44.8$$

The batsman with more arthimetic mean is better run getter
So, Batsman B with arithimatic

mean of 99.8 is better, run getter

b) more consistent player

→ Co-efficient of variation, C.V of batsman A

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

Standard deviation of A

$$S = \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{\Sigma x}{n}\right)^2}$$

$$S = \sqrt{\frac{58322}{10} - \left(\frac{516}{10}\right)^2}$$

$$S = \sqrt{5332.2 - 2662.56}$$

$$S = \sqrt{3169.64}$$

$$S = 56.29$$

$$C.V \text{ of } A = \frac{S}{\bar{x}_A} \times 100$$

$$= \frac{56.29}{51.6} \times 100$$

$$= 109.08\%$$

$$C.V \text{ of } B = \frac{S_B}{\bar{x}_B} \times 100$$

Standard deviation of B

$$S_B = \sqrt{\frac{\Sigma y^2}{n} - \left(\frac{\Sigma y}{n}\right)^2}$$

$$S_B = \sqrt{\frac{15\,8606}{10} - \left(\frac{998}{10}\right)^2}$$

$$= \sqrt{15\,860.6 - 9960.04} = \sqrt{5900.56}$$

$$S_B = 76.81$$

$$C.V \text{ of } B = \frac{\sigma_B}{\bar{x}_B} \times 100$$

$$= \frac{76.81}{99.8} \times 100$$

$$= 76.96\%$$

$$C.V \text{ of } C = \frac{\sigma_c}{\bar{x}_c} \times 100$$

Standard deviation of C

$$\sigma_c = \sqrt{\frac{\Sigma z^2}{n} - \left(\frac{\Sigma z}{n}\right)^2}$$

$$= \sqrt{\frac{34378}{10} - \left(\frac{448}{10}\right)^2}$$

$$\sigma_c = \sqrt{3437.8 - 2007.04}$$

$$\sigma_c = \sqrt{1430.79}$$

$$\boxed{\sigma_c = 37.82}$$

$$C.V \text{ of } C = \frac{S_C}{\bar{x}_C} \times 100$$

$$= \frac{37.82}{44.8} \times 100$$

$$= 84.41\ \%$$

The batsman with least Co-efficient of variation is more consistent player so batsman B with C.V = 76.96 is more consistent player.

c) More variate player.

A large value of co-efficient of variation indicates that it is more variate.

Hence C.V of A = 109.08 %.

So batsman A is more variate.

Q NO 2

Sol:-

Classes	Class boundries	Frequency F	Mid Point x_i	Cf	$f x_i$
2 - 4	1 - 5	3	3	3	9
6 - 8	5 - 9	13	7	16	91
10 - 12	9 - 13	6	11	22	66
14 - 16	13 - 17	10	15	32	150
18 - 20	17 - 21	5	19	37	95
22 - 24	21 - 25	3	23	40	69
26 - 28	25 - 29	5	27	45	135
30 - 32	29 - 33	3	31	48	93
34 - 36	33 - 37	2	35	50	70
		$\Sigma 50$			778

a) **Mean :-**

$$\bar{x} = \frac{\Sigma f x_i}{f} = \frac{778}{50}$$

$$\bar{x} = 15.56$$

Mode = 13 + 4 ...

b) Median :

$$\rightarrow \frac{n}{2} = \frac{50}{2} = 25$$

$$= l + \frac{h}{f}\left(\frac{n}{2} - cf\right)$$

$$= 13 + \frac{4}{10}(25 - 22)$$

$$= 14.2$$

c) Mode

$$\text{Mode} = l + \frac{fm - f_1}{(fm - fi) + (fm - f_2)} \times h$$

$l = 13$, $fm = 10$, $f_1 = 6$, $f_2 = 5$

$h = 4$

$$\text{Mode} = 13 + \frac{10 - 6}{(10 - 6) + (10 - 5)} \times 4$$

$$\text{Mode} = 13 + \frac{4}{(4)+(5)} \times 4$$

$$= 13 + \frac{4}{9} \times 4$$

$$= 14.77$$

→ As the values of median mean and mode differ from each other so the distribution is a ~~asymmetrical~~ symmetrical.

→ Also mean is greater than median so it is a positively skewed distribution.

→ when data are skewed left the mean is smaller than the median. if the data are symmetric, they have about the same shape on either side of the middle.

Q NO 3

Merits and demerits of Geometric mean and Median.

→ **Geometric mean:**

Merits:

- It is rigidly defined and its value is a precise figure.
- It is based on all observation.
- It is capable of further algebaric treatment
- It is not much affected by fluctuation of sampling
- It is not affected by extreme values.

Demerits:

- It cannot be calculated if any one of the observation is negative or zero.
- Its calculation is rather difficult
- It is not easy to understand
- It may not coincide with any of the observation.

observation.

Median:

Merits:

- It is easily calculated and understood
- It is located even when the values are not capable of quantitative measurement.
- It is not affected by extreme value.
- It can be computed even when a frequency distribution involves "open end" classes like those of income and price.
- In a highly skewed distribution, median is an appropriate average to use.

Demerits:

- It is not rigorously defined.
- It is not capable of lending itself to further statistical treatment.

- It the data are

- It is necessitates the arrangment of data into a array which can be tedions and time consuming.