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Section

B

Subject

Probability & Statistics

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Submitted to

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Q. No #01 :

Batsman A		Batsman B		Batsman C	
Score x	x^2	Score y	y^2	Score z	z^2
12	144	3	9	5	25
15	225	13	169	14	196
6	36	43	1849	36	1296
73	5329	102	10404	105	11025
7	49	175	30625	99	9801
19	361	220	48400	20	400
199	39601	204	41616	15	225
36	1296	139	19321	96	9216
84	7056	69	4761	13	169
65	4225	30	900	45	2025
516	58322	998	158054	448	34378

Batsman A

Mean score

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

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

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

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

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

$$= \sqrt{3169.64}$$

$$= 56.29$$

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

$$C.V = \frac{56.29}{51.26} \times 100$$

$$\boxed{C.V = 109\%}$$

Batsman B

Mean score

$$\bar{y} = \frac{\Sigma y}{n}$$

$$\bar{y} = \frac{998}{10}$$

$$\boxed{\bar{y} = 99.8}$$

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

$$= \sqrt{\frac{158054}{10} - \left(\frac{998}{10}\right)^2}$$

$$= \sqrt{5845.36}$$

$$= 76.45$$

$$C.V = \frac{S_y}{\bar{y}} \times 100$$

$$C.V = \frac{76.45}{99.8} \times 100$$

$$\boxed{C.V = 76.6\%}$$

Batsman C

Mean score

$$\bar{z} = \frac{\Sigma z}{n}$$

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

$$\boxed{\bar{z} = 44.8}$$

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

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

$$= \sqrt{1430.76}$$

$$= 37.82$$

$$C.V = \frac{S_z}{\bar{z}} \times 100$$

$$C.V = \frac{37.82}{44.8} \times 100$$

$$\boxed{C.V = 84\%}$$

x_i	$x_i - \mu$	$(x_i - \mu)^2$
12	-39.6	1568.16
15	-36.6	1339.56
6	-45.6	2079.36
73	21.4	457.96
7	-44.6	1989.16
19	-32.6	1062.76
199	147.4	21726.76
36	-15.6	243.36
84	32.4	1049.76
65	13.4	179.56
516	0	31696.4

y_i	$(y_i - \mu)$	$(y_i - \mu)^2$
3	-96.8	9370.24
13	-86.8	7534.24
43	-56.8	3226.24
102	2.2	4.84
175	75.2	5655.04
220	120.2	14448.04
204	104.2	10857.64
139	39.2	1536.64
69	-30.8	948.64
30	-69.8	4872.04
998	0	58453.6

z_i	$z_i - \mu$	$(z_i - \mu)^2$
5	-29.8	1584.04
14	-30.8	948.64
36	-8.8	77.44
105	60.2	3624.04
99	54.2	2937.64
20	-24.8	615.04
15	-29.8	888.04
96	51.2	2621.44
13	-31.8	1011.24
45	0.2	0.04
448	0	14307.6

$$\sigma_x^2 = \frac{\epsilon (x_i - \mu)^2}{N} = \frac{31696.4}{10}$$

$$\boxed{\sigma x^2 = 3169.64}$$

$$\sigma_y^2 = \frac{\epsilon (y_i - \mu)^2}{N} = \frac{58453.6}{10}$$

$$\boxed{\sigma_y^2 = 5845.36}$$

$$\sigma_z^2 = \frac{\epsilon (z_i - \mu)^2}{N} = \frac{14307.6}{10}$$

$$\boxed{\sigma_z^2 = 1430.76}$$

Ans

(A) Batsman B is better run getter than A and C.
Because average of B is 99.8 and A is 51.6 and C is 44.8

(B) Batsman B is also a more consistent player than A and C because coefficient of variation of B is smaller than A and C Here B = 76.6%
A = 109% C = 84%

(C) Player B is more variant than A and C

Empirical Relation of player A

A : B : C

51.6 : 99.8 : 44.8

1 : 1.93 : 0.8682

Q No #2 (10)

Classes	f	x	C.f	fx
2-4	3	3	3	9
6-8	13	7	16	91
10-12	6	11	22	66
14-16	10	15	32	150
18-20	5	19	37	95
22-24	3	23	40	69
26-28	5	27	45	135
30-32	3	31	48	93
34-36	2	35	50	70
	$\Sigma f =$ 50			$\Sigma fx =$ 778

Mean:

$$\bar{x} = \frac{\Sigma f x}{\Sigma f}$$

$$\bar{x} = \frac{778}{50}$$

$$\boxed{\bar{x} = 15.56}$$ Ans

Median:

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

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

Now go to the table

Check c.f of 25 coming

row

From table we can check these values

$l = 14$

$h = 2$

$f = 15$

$c.f = 22$

$$\text{Median} = 14 + \frac{2}{15}(25 - 22)$$

$$= 14 + \frac{2}{15}(3)$$

Median = 14.4 Ans

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

Here we can check $f_m = 10$ then

$l = 14$

$f_1 = 6$

$f_2 = 5$

$h = 2$

$$\text{Mode} = 14 + \frac{10 - 6}{(10-6) + (10-5)} \times 2$$

$$= 14 + \frac{4}{4+5} \times 2$$

$$= 14 + \frac{4}{9} \times 2$$

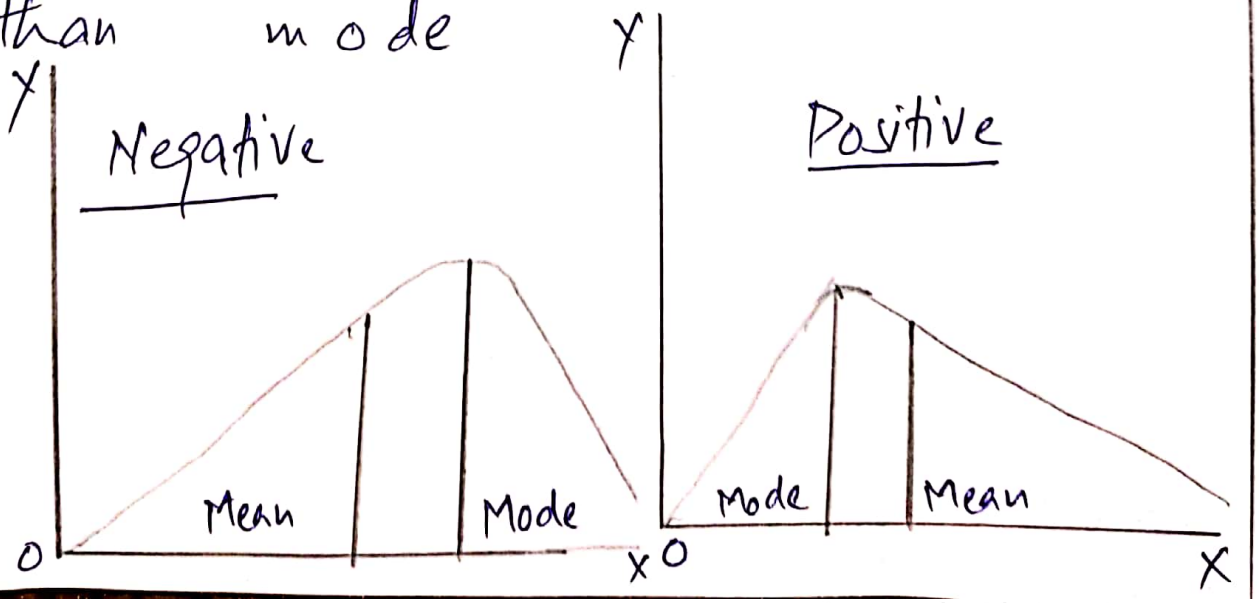
$$= 14 + 0.8$$

Mode = 14.8 Ans

Characteristic of skewness :

Positive skewness means when the tail on the right side of the distribution is longer or fatter. The mean and median will be greater than the mode

Negative skewness is when the tail of the left side of the distribution is longer or fatter than the tail on the right side. The mean and median will be less than mode



Symmetrical Characteristics

In symmetrical characteristics is a probability distribution an which we assignment of probabilities to possible occurances, which is unchanged when its probability density function or probability mass function is reflected around vertical line at some value of the random variable represented by the distibation.

Q. No #03:

Merit of Median:

* 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".
* In a highly skewed distribution, median is an appropriate average to use.

Demerit of Median :

* It is not rigorously defined.
* It is not capable of lending itself to further statistical treatment.
* It is neccessitates the arrangements of data into an array which can be tedious and time consuming for a large body of data.

Merit of Geometric Mean:

* It is based on all observed values
* It is rigorously defined by a mathematical formula
* It gives equal weightage to all observation
* It is not affected by sampling variability.
* It is amenable to mathematical treatment in certain cases.

Demerit of Geometric Mean:

* It is neither easy to calculate nor to understand
* It vanishes if any observation is zero
* In case of negative values, it cannot be computed at all.

The End!