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Q.NO :- 1

Solution:-

The Estimated regression Line of Y on X is.

$$\hat{Y} = a + bx$$

and the two normal equations are:-

$$\Sigma Y = na + b\Sigma X$$

$$\Sigma XY = a\Sigma X + b\Sigma X^2$$

To compare the necessary Summation we arrange the computation in the table below,

X	Y	XY	X^2
53	20	1060	2809
62	32	1984	3844
57	45	2565	3249
71	60	4260	5041
78	80	6240	6084
46	100	4600	2116
86	120	10320	7396

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87	140	12180	7569
96	160	15360	9216
91	180	16380	8281
94	200	18800	8836
94	210	11280	8836
$\Sigma X = 915$	$\Sigma Y = 1347$	$\Sigma XY = 113489$	$\Sigma X^2 = 73277$

$$\bar{X} = \frac{\Sigma X}{n} = \frac{915}{12} = 76.25$$

$$\bar{Y} = \frac{\Sigma Y}{n} = \frac{1347}{12} = 112.25$$

$$b = \frac{n\Sigma XY - (\Sigma X)(\Sigma Y)}{n\Sigma X^2 - (\Sigma X)^2}$$

$$b = \frac{12(113489) - (915)(1347)}{12(73277) - (915)^2}$$

$$b = 0.172$$

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$a = \bar{Y} - b\bar{x}$

$a = 112.25 - (0.172)(76.25)$

$a = 99.135$

Hence the desired estimated regression Line of Y on x is

$$\hat{Y} = 99.135 + 0.172x$$

The estimated regression co-efficient $b = 0.172$, which indicate that the value of Y increases by 0.172 units for a unit increases in X.

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Co-efficient Correlation Y on X :-

$$r = \frac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2 - (\sum x)^2 \; n\sum y^2 - (\sum y)^2}}$$

$$r = \frac{12(113489) - (915)(1347)}{\sqrt{12(73277) - (915)^2 \; 12(181440 9) - (1814409)}}$$

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Q.NO:-2

Part:- a.

Solution:-

$$n(S) = \binom{13}{3} = 286$$

Let, A = Denote all balls are of different Colours.

$$n(A) = \binom{4}{1}\binom{4}{1}\binom{5}{1} = 4 \times 4 \times 5 = 80$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{80}{286} = 0.28$$

$2 \times 2 \times 2 = 8$	$3 \times 2 \times 2 = 12$	$3 \times 3 \times 2 = 18$

Interpretation:-

There are 28% Chances that all balls are of different colours.

Let, B = Denote all balls of same colours.

red white green

$$n = (B) = \binom{4}{3} \text{ or } \binom{4}{3} \text{ or } \binom{5}{3}$$

$$= \binom{4}{3} + \binom{4}{3} + \binom{5}{3} = 4 + 4 + 10 = 18.$$

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$$P(B) = \frac{n(B)}{n(S)} = \frac{18}{286} = 0.063$$

Interpretation:-

There are 6.3% chances that all balls of same colours.

Part:- b.

Solution:-

$$n(S) = \binom{12}{4} = 495$$

Let, A = denote the event that exactly one egg is bad.

$$n(A) = \binom{2}{1}\binom{10}{3} = 2 \times 120 = 240$$

$$P(A) = \frac{n(A)}{n(S)} = \frac{240}{495} = 0.48$$

Interpretation:-

There are 48% chances that exactly one egg is bad.

Let, B = be the event that at Least one bad egg is selected.

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$$n(B) = \binom{2}{1}\binom{10}{3} + \binom{2}{2}\binom{10}{2}$$

$$= 2 \times 120 + 1 \times 45$$

$$= 240 + 45$$

$$= 285$$

$$P(B) = \frac{n(B)}{n(S)}$$

$$= \frac{285}{495}$$

$$= 0.58$$

Interpretation:-

There are 58% chances that at least one bad egg is selected.

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Q.NO :- 3

Solution :-

A	B	C
12	47	15
15	12	23
6	76	52
73	48	4
7	4	46
46	46	46 (ID)
199	37	74
36	48	52
84	13	13
29	3	4

Rang = $X_m - X_o$

Rang for A = 199 - 6 = 193

Rang for B = 46 - 3 = 43

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Rang for C = 46 − 4 = 42

Batsman A		Batsman B		Batsman C	
X	X^2	Y	Y^2	Z	Z^2
12	144	47	2209	15	225
15	225	12	144	23	529
6	36	76	5776	52	2704
73	5329	48	2304	4	16
7	49	4	16	24	576
46	2116	46	2116	46	2116
199	39601	37	1369	74	5476
36	1296	48	2304	52	2704
84	7056	13	169	13	169
29	841	3	9	4	16
$\Sigma X = 507$	$\Sigma X^2 = 56693$	$\Sigma Y = 334$	$\Sigma Y^2 = 16416$	$\Sigma Z = 307$	$\Sigma Z^2 = 14531$

Batsman A = $\bar{X} = \frac{\Sigma X}{n}$

$$= \frac{507}{10} = 50.7$$

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$$\text{Batsman B} = \bar{Y} = \frac{\Sigma Y}{n}$$

$$= \frac{334}{10} = 33.4$$

$$\text{Batsman C} = \bar{Z} = \frac{\Sigma Z}{n}$$

$$= \frac{307}{10} = 30.7$$

For Batsman A:-

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

$$Sx = \sqrt{\frac{56693}{10} - \left(\frac{507}{10}\right)^2}$$

$$Sx = 55.7$$

$$C.V = \frac{55.7}{\bar{X}} \times 100$$

$$C.V = \frac{55.7}{50.7} \times 100 = 10.97$$

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For Batsman B :-

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

$$S_y = \sqrt{\frac{16416}{10} - \left(\frac{334}{10}\right)^2}$$

$$S_y = 22.935$$

$$C.V = \frac{22.935}{\bar{Y}} \times 100$$

$$C.V = \frac{22.935}{33.4} \times 100 = 6.866$$

For Batsman C :-

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

$$S_z = \sqrt{\frac{14531}{10} - \left(\frac{307}{10}\right)^2} = 22.596$$

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$$C.V = \frac{22.596}{307} \times 100$$

$$C.V = 7.360$$

Batsman B is more co-efficient as it value of co-efficient of variance is smalles.

compare A with B

B is consistan.

compare B with A

B is more constant

compare A with C

C is more constant.

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