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B E (C) Section B

Semester Summer Examination

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Question No 1.

Compute and analyze the results of the least squares regression equation and co-efficient of correlation of Y on X for the following data. Compare your manual results with the outcomes

Question No2 :-

Solution :-

X	Y	XY	X^2	Y^2
53	20	1060	2809	400
62	32	1984	3844	1024
57	45	2565	3249	2025
71	60	4260	5041	3600
78	80	6240	6084	6400
68	100	6800	4624	10000
86	120	10320	7396	14400
87	140	12180	7569	19600
96	160	15360	9216	25600
91	180	163800	8281	32400
94	200	18800	8836	40000
94	210	11280	8836	44100
ΣX 937	ΣY 1347	ΣXY 107229	ΣX^2 75785	ΣY^2 199549

$$y = a + bx \quad \text{—(i)}$$

$$a = \bar{y} - bx \quad \text{—(ii)}$$

$$\text{So } \bar{y} = \frac{\Sigma y}{n} = \frac{1347}{12} = 112.25 \quad \text{—(iii)}$$

$$\bar{x} = \frac{\Sigma x}{n} = \frac{937}{12} = 78.08 \quad \text{— (iv)}$$

where

$$b = \frac{n \Sigma xy - \Sigma x \Sigma y}{n \Sigma x^2 - (\Sigma x)^2}$$

$$b = \frac{12 (107229) - (1262139)}{12 (75785) - (877969)}$$

$$= 0.7824 \quad \text{— (v)}$$

putting eq (iii) (iv) & (v) in eq (ii)

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

$$a = 112.25 - 0.7824$$

$$a = 111.4676$$

Y on X is

$$\hat{Y} = 112.24$$

The estimated regression coefficient $b = 0.78$. which indicates that the values of Y increases by 0.78 with for a unit increase in X.

Now coefficient of corelation.

$$r = \frac{\Sigma XY - (\Sigma n)(\Sigma Y)/n}{\sqrt{(\Sigma x^2) - (\Sigma x^2)/n \left[\Sigma y^2 - \Sigma Y^2/n \right]}}$$

$$r = \frac{(107229) - (937)\left(\frac{1347}{12}\right)}{\sqrt{(75785) - \frac{(831)^2}{12}\left[199549 - \frac{(1347)^2}{12} \right]}}$$

$$r = \frac{2050.75}{145128737.3} \quad \boxed{= 1.62 \times 10^{-4}}$$

Question No. 2 (A)

A box contains 4 red 4 white and 5 green balls. Three balls are drawn from the box together....

Solution:-

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

Let A = Denote all balls are of different colours

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

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

$2 \times 2 \times 2 = 8$

$\Rightarrow$ even x even x even = even

$3 \times 2 \times 2 = 12$

$\Rightarrow$ odd x even x even = even

$3 \times 3 \times 2 = 18$

$\Rightarrow$ odd x odd x even = even

Interpretations:- There are 28% chances that all balls are of different colours.

(ii) Let B = Denote all balls of same colours

$$n(B) = \binom{4}{3}_{\text{Red}} \text{ or } \binom{4}{3}_{\text{White}} \text{ or } \binom{5}{3}_{\text{Green}}$$

$$= \binom{4}{3} + \binom{4}{3} + \binom{5}{3}$$

$$= 4 + 4 + 10 = 18$$

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

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

Question No 2 (B)

Of 12 eggs in a refrigerator, 2 are bad. From these 4 eggs are chosen at random b/w alle.....

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.

(ii) Let B = be the even that at least one bad egg is selected

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

$$= 2 \times 120 + 1 \times 45 = 285$$

$$P(B) = \frac{n(B)}{n(S)} = \frac{285}{495} = 0.58$$

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

Question No 3.

The following are the scores made by three batsman A, B and C in a series of innings.

A	B	C
12	47	15
15	12	23
6	76	52
73	48	4
7	4	24
68	68	68
199	37	74
36	48	52
84	13	13
29	3	4

Range $= X_m - X_0$

Range of A $= X_m - X_0$

$= 199 - 6$

$= 193$

Range of B $= x_m - x_0$

$= 76 - 3$

$= 73$

Range of C $= x_m - x_0$

$= 74 - 4$

$= 70$

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
68	4624	68	4624	68	4624
199	39601	37	1369	74	5476
36	1296	48	2304	52	2704
84	7056	13	169	13	169
29	841	3	9	4	16
$\Sigma x =$ 529	$\Sigma x^2 =$ 59201	$\Sigma Y =$ 356	$\Sigma Y^2 =$ 18924	$\Sigma z =$ 329	$\Sigma z^2 =$ 17039

Batsman A :-

$$\bar{x} = \frac{\Sigma x}{n} \qquad \because n = 10$$

$$= \frac{529}{10}$$

$$= 52.9$$

$$S_x = \sqrt{\frac{\Sigma x^2}{n} - \left(\frac{529}{10}\right)^2}$$

$$= \sqrt{\frac{59201}{10} - \left(\frac{529}{10}\right)^2} \quad = \sqrt{5920.1 - 2798.41}$$

$$S_{\bar{x}} = 55.87$$

$$C.V = \frac{55.87}{52.9} \times 100$$

$$= 105.61$$

Batsman B :-

$$\bar{y} = \frac{\Sigma y}{n} = \frac{356}{10} = 35.6$$

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

$$= \sqrt{\frac{18924}{10} - \left(\frac{356}{10}\right)^2}$$

$$= \sqrt{1892.4 - 1267.36}$$

$$= 25.0009$$

$$C.V = \frac{25.0009 \times 100}{35.6}$$

$$= 70.22\ \%$$

Batsman C :-

$$\bar{z} = \frac{\Sigma z}{n} = \frac{329}{10} = 32.9$$

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

$$= \sqrt{\frac{17039}{10} - \left(\frac{329}{10}\right)^2}$$

$$= \sqrt{1703.9 - 1082.41}$$

$$= \sqrt{621.49}$$

$$= 24.929$$

$$C.V = \frac{24.92}{32.9} \times 100$$

$$= 75.74$$

⇒ So Batsman B is more consistant as it value of co-efficient of varience is smallest

⇒ Compare A with B

⇒ B is consistant

⇒ Compare B with A

⇒ B is more consistant

⇒ Compare A with C

⇒ C is more consistant