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Section B

Semester 6th

Subject Probability & Statistics

Submitted To.

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QNO (01):-

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
31	100	3100	961	10000
86	120	10320	7396	14400
87	140	12180	7569	19600
96	160	15360	9216	25600
91	180	16380	8281	32400
94	200	18800	8836	40000
94	210	11280	8836	44100
$\Sigma x = 900$	$\Sigma y = 1347$	$\Sigma xy = 103529$	$\Sigma x^2 = 72122$	$\Sigma y^2 = 199549$

As

$$y = a + bx \quad \text{--- (i)}$$

$$a = \bar{y} - b\bar{x} \quad \text{--- (ii)}$$

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

$$\bar{x} = \frac{\Sigma x}{n} = \frac{900}{12} = 75 \quad \text{--- (iv)}$$

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

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

$$b = \frac{12(103529) - (900)(1347)}{12(72122) - (900)^2}$$

$$b = 30048 / 55464$$

$$\boxed{b = 0.54} \quad \text{--- (v)}$$

puting eq (iii) (iv) and (v) in eq (ii)

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

$$a = 112.25 - (0.54)(75)$$

$$\boxed{a = 71.75}$$

Hence the desired estimated regression line y on x is

$$\hat{y} = 71.75 + 0.54x$$

The estimated regression Co-efficent b = , which indicates that value of y increase by 0.54 units for a unit increase in 'x'.

Now Co-efficient For Co-relation

As we know

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

$$r = \frac{103529 - \frac{(900)(1347)}{12}}{\sqrt{\left[\cancel{810000}\ 72122 - \frac{810000}{12}\right]\left[199549 - \frac{1814409}{12}\right]}}$$

$$r = \frac{103529 - 101025}{\sqrt{(72122 - 67500)(199549 - 151200.75}}$$

$$r = \frac{2504}{\sqrt{223465611.5}}$$

$$\boxed{r = 0.167}$$

Ans/

4622
~~458~~

14948
.766
104504.75

QNO. (02):-

(a) Solution:-

(i) Here $n(S) = \binom{13}{3} = 286$ Sample points.

Let 'A' be the event that all balls drawn are different colours.
Then 'A' contains;

$$\binom{4}{1}\binom{4}{1}\binom{5}{1} = 4*4*5 = 80 \text{ Sample points.}$$

Now

$$P(A) = \frac{n(A)}{n(S)} = \frac{80}{286} = \frac{40}{143}$$

or $p(A) = 0.28$

Thus it mean that;

There are 28% chances that all balls are different colours.

(ii) Let B be the event that all balls drawn are of same colour. Then 'B' contains:

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

Sample points. i.e $n(B) = 18$

Now $P(B) = \frac{n(B)}{n(S)} = \frac{18}{286} = 9/143$

or $P(B) = 0.063$

Thus it mean that there are 6.3% chances that all balls are same colours.

(b) Solution :-

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

as 'S' can Occure in $\binom{12}{4} = 495$ ways.

The number of ways in which 4 eggs can be chosen from 12 eggs.

Let 'A' denote the event exactly one egg is bad and 'B' denote the event that at least one egg is bad then;

(i) $n(A) = \binom{2}{1}\binom{10}{3} = 240$ (ways)

Hence $p(A) = \frac{n(A)}{n(S)} = \frac{240}{495} = 16/33$

or $P(A) = 0.48$

Thus there are 48% chances that exactly one egg is bad.

(ii) Let 'B' the event at least one egg is bad.

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

$= 2 * 120 + 1 * 45 = 285$

$P(B) = \frac{n(B)}{n(S)} = \frac{285}{495} = 19/33$

or $P(B) = 0.58$

Thus there are 58% chances that at least one egg is bad.

QNO. (03):-

The following Scores made by three batsmen A, B and C

A	B	C
12	47	15
15	12	23
6	76	52
73	48	4
7	4	24
31	31	31
199	37	74
36	48	52
84	13	13
29	3	4

~~(i)~~ (a) Now

Range $= X_m - X_o$

(i) Range of A $= X_m - X_o$

$= 199 - 6$

$= 193$

(ii) Range of 'B'

Range of B $= X_m - X_o$

$= 76 - 3$

$= 73$

Scanned with CamScanner

(iii) Range of $C = X_m - X_0$
$= 74 - 4$
$= 70$

Batsmen (A)		Batsmen (B)		Batsmen (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
31	961	31	961	31	961
199	39601	37	1396	74	5476
36	1296	48	2304	52	2704
84	7056	13	169	13	169
29	841	3	9	4	16
$\Sigma x = 492$ $\Sigma x = 492$	$\Sigma x^2 = 55538$	$\Sigma x = 319$	$\Sigma y^2 = 15288$	$\Sigma z = 292$	$\Sigma z^2 = 13376$

Batsmen A:

$\because n = 10$

$$\text{Mean Scores } (\bar{x}) = \frac{\sum x_i}{n}$$

$$= \frac{492}{10} = 49.2$$

i.e $\bar{x} = 49.2$ Scores.

$$S_x = \sqrt{\frac{\sum x^2}{n} - \left(\frac{\sum x}{n}\right)^2} = \sqrt{\frac{55538}{10} - \left(\frac{492}{10}\right)^2}$$

$$= \sqrt{5553.8 - 2420.64}$$

$$= \sqrt{3133.16}$$

$= 55.97$ Scores and

$$C.V = \frac{S_x}{\bar{x}} * 100 = \frac{55.97}{49.2} = 113.76\%$$

$$\boxed{C.V = 113.76\%}$$

Batsmen (B):

Mean Scores $(\bar{y}) = \frac{\Sigma y}{n} = \frac{319}{10}$

$\bar{y} = 31.9$ Scores

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

$= \sqrt{\frac{15288}{10} - \left(\frac{319}{10}\right)^2}$ $\therefore 31.9$

$= \sqrt{1528.8 - 1017.61}$ $\therefore 511.19$

$S_y = 22.60$ Scores

$C.V = \frac{S_y}{\bar{y}} \times 100 = \frac{22.60}{31.9} \times 100$

$\boxed{C.V = 70.87\%}$

Batsmen C:

$$\text{Mean Scores } (\bar{z}) = \frac{\Sigma z}{n}$$

$$= \frac{292}{10} = 29.2$$

$$\bar{z} = 29.2$$

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

$$S_z = \sqrt{\frac{13376}{10} - \left(\frac{292}{10}\right)^2}$$

$$S_z = \sqrt{1337.6 - (29.2)^2}$$

$\therefore 852.64$

$S_z = 22.021$ Scores

$\therefore 484.96$

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

$$C.V = \frac{22.021}{29.2} \times 100$$

$$\boxed{C.V = 75.41\%}$$

(b) Batsmen 'B' is more Consisten as its value of Cofficient of Variation is Smallest (C.V = 70.87%)

(c)

Campare 'A' with 'B'
'B' is Consistent

Campare 'B' with 'A'
'B' is more Consistent

Campare 'A' with 'C'
'C' is more consistent

Thus the reqiired results