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Semester = 7th

section = B

Subject = Probability

Question No 1

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
59	100	5900	3481	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	19780	8836	44100

7859 (2)

ΣX	ΣY	ΣXY	ΣX^2	ΣY^2
928	1347	106329	74642	199549

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

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

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

$$\bar{x} = \frac{\Sigma x}{n} = \frac{928}{12} = \boxed{77.33} \quad -iv$$

where

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

$$b = \frac{12(106329) - (1250016)}{12(74642) - (861184)}$$

$$\boxed{b = 0.751} \quad -(v)$$

Putting eq (iii), iv and (v) in eq (ii)

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

$a = 112.25 - 0.751(77.33)$

$\boxed{a = 54.1}$

estimated regresion lin

Y on x is

$\hat{Y} = 54.1 + 0.751x$

The estimated regression co-ficient

$b = 0.751$ which indicate the value of Y increase by 0.751 units for a unit increase in x

Now co-effient for corelation

As we know

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

$$r = \frac{(10639) - (988)(1347)/12}{\sqrt{(74642) - (861184)/12\left\{199549 - \frac{(1841449)}{12}\right\}}}$$

$$r = \frac{3161}{13415188 9.3}$$

$$r = 1.58 \times 10^{-5}$$

"Question No "3"

"Part "A"

A box contain 4 red, 4 white and 5 green balls. These balls are drawn from the box together. Find the Probability that may be (i) all of different colours (ii) all of the same colours.

Solution:-

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

Let A = Denote all balls are of different colours.

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

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

Note :- There are 28% chances that all balls are of diffrent colours.

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

Red white green

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

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

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

Note : There are 6.3 % chance that all balls of same colours.

7859

(7)

"Question No 2"

"Part 'B"

Of 12 eggs in a refrigerator, 2 are bad From these, 4 eggs are chosen at random to make a cake. what are the probabilities that (i) exactly one is bad (ii) At least one is bad?

Solution:-

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

let A = denote the event that exactly one egg is bad

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

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

Note: There are 48% chance that exactly one egg is bad

(ii) Let B = be the event that ~~exactly one egg is bad~~ at least one bad egg is selected.

$$n(B) = \binom{7}{1}\binom{10}{3} + \binom{7}{2}\binom{10}{7}$$

$$= 7 \times 120 + 21 \times 45 = 840 + 45 = 885$$

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

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

Question No 3

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

A	B	C
12	47	15
15	12	23
6	76	52
73	48	4
7	4	24
59	59	59
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
59	3481	59	3481	59	3481
199	39601	37	1369	74	5476
36	1296	48	2304	52	2704
84	7056	13	169	13	169
29	841	3	9	4	16
$\Sigma x = 520$	$\Sigma x^2 = 56767$	$\Sigma y = 347$	$\Sigma y^2 = 17781$	$\Sigma z = 320$	$\Sigma z^2 = 15896$

Now Batsman A :-

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

$$\bar{x} = \frac{520}{10} = 52$$

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

$$= \sqrt{\left(\frac{56768}{10}\right) - \left(\frac{570}{10}\right)^2}$$

$$= \sqrt{\frac{56768}{10} - \left(\frac{570}{10}\right)^2}$$

$$= 54.573$$

$$C.V = \frac{54.573}{\bar{x}} \times 100 = \frac{54.573}{57} \times 100$$

$$C.V = 104.85$$

Batsman B :-

$$\bar{y} = \frac{\Sigma y}{n} = \frac{347}{10} = 34.7$$

$$\sigma y = \sqrt{\left(\frac{17781}{10}\right) - \left(\frac{347}{10}\right)^2}$$

$\sigma Y = 23.9$

$C.V = \frac{23.9}{34.7} = 68.87$

Batsman C

$\bar{Z} = \frac{\Sigma Z}{n} = \frac{320}{10} = 32$

$\sigma Z = \sqrt{\frac{15896}{10} - \left(\frac{320}{10}\right)^2}$

$S_Z = 23.78$

$C.V = \frac{SZ}{\bar{Z}}$

$C.V = \frac{23.78}{32} \times 100$

$C.V = 74.31$

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

⇒ Compare A with B

B is ~~more~~ consistant

⇒ compare B with C

B is consistant

⇒ compare A with C

C is consistant.