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Sec :- A

Subject :- Probability and Statistics

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Qno(1)

Compute and analyse the results of the least squares regression equation and coeffent of Correlation of Y on x for the Following Data. Compare your manual results with the outcome of SPSS?

estimated regression

Y on X

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

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

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

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

$\bar{y} = a + bx$

$\Sigma y = na + b\Sigma x$

$\Sigma xy = a\Sigma x + b\Sigma x^2$

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

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

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	86	6240	6084	6400
17	100	1700	289	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	19740	8836	44100
886	$\Sigma y = 1347$	$\Sigma xy = 110589$	$\Sigma x^2 = 71477$	$\Sigma y^2 = 199549$

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

$$\bar{x} = \frac{886}{12}$$

$$\bar{x} = 73.83$$

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

$$= \frac{1347}{12}$$

$$= 112.25$$

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

$$= \frac{12(110589) - (886)(1347)}{12(71477) - (886)^2}$$

$$b = 1.82$$

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

$$a = 112.25 - (1.82)(73.83)$$

$$a = -22.12$$

Co-effiient of correlation

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

[redacted]

$$r = \frac{12(110589) - (886)(1347)}{\sqrt{(12(71477 - (886)^2}(12(199549 - (1347)^2}$$

$$r = \frac{133626}{3900244}$$

$$= 0.034$$

Qno 2(A)

A box contain 4 red, 4 white and 5 green balls. Three balls are drawn From the box together. Find the probability that they make

(i) All of different colors (ii) all of the same colors.

Solution:-

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

let A = Denote all balls are of different colors

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

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

Interpretation- There are 28% chances that all balls are of different color.

ii) let B = Denoted all balls of same color.

Red white Green

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

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

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

There are 6.3% Chances that all balls are of same color.

Qno 2 (B)

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

Solution:-

S can occure in $\binom{12}{4} = 495$ ways, the number of ways in which 4 eggs can be choosen from 12

let A = Denote that exactly one bad egg.

$$A = \binom{2}{1}\binom{10}{3} = 240$$

$$P(A) = \frac{240}{495} = \frac{16}{33} = 0.48$$

There are 48 % chances that exatly one bad egg.

ii) let B = Denote that at least one bad egg

$$B = \binom{2}{1}\binom{10}{3} + \binom{2}{2}\binom{10}{2} = 285$$

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

There are 58% chances that atleast one bad egg is seleded

Qno(3)

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

(A) Find the range of Batsman A, B, and C?

A	B	C
12	47	15
15	12	23
6	76	52
73	48	4
7	4	24
17	17	17
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 $= 76 - 3$

$= 73$

Range of C $= 74 - 4$

$= 70$

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
17	289	17	289	17	289
199	39601	37	1369	74	5476
36	1296	48	2304	52	2704
84	7056	13	169	13	169
29	841	3	9	4	16
$\Sigma x = 478$	$\Sigma x^2 = 54866$	$\Sigma y = 305$	$\Sigma y^2 = 14589$	$\Sigma z = 278$	$\Sigma z^2 = 12704$

Batsman A :-

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

$$\bar{x} = \frac{478}{10} = 47.8$$

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

$$= \sqrt{\frac{54866}{10} - \left(\frac{478}{10}\right)^2}$$

$$S_{\bar{x}} = 56.58$$

$$C.V = \frac{56.58}{\bar{x}} \times 100$$

$$= \frac{56.58}{47.8}$$

$$= 1.18 \times 100$$

$$C.V = 118.36$$

Batsman B

$$Y = \frac{\Sigma Y}{n} = \frac{305}{10} = 30.5$$

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

$$= \sqrt{\frac{14589}{10} - \left(\frac{305}{10}\right)^2}$$

$$= 22.99$$

$$C.V = \frac{22.99}{30.5} \times 100$$

$$= 75.37\%.$$

Batsman C

$$z = \frac{\Sigma z}{n} = \frac{278}{10} = 27.8$$

$$S_z = \sqrt{\frac{12704}{10} - \left(\frac{278}{10}\right)^2}$$

$$= 22.24$$

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

$$= \frac{22.24}{27.8} \times 100$$

$$= 80$$

Batsman B is more consistant as it value of co-effient of variance is smallest

Compare A with B

B is more consistant

Compare B with A

B is more consistat

Compare A with C

C is more consistant.