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Qno1

Compute and analyze the results of the least squares regression Equation and coefficient of correlation on Y on X for the following data. Compare your manual results with out come of SPSS?

Solution:-

(i) (A) least square Regression Equation

$$\bar{y} = a + bx$$

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

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

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	80	6240	6084	6400
87	100	8700	7569	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
$\Sigma x = 956$	$\Sigma y = 1347$	$\Sigma xy = 117589$	$\Sigma x^2 = 78730$	$\Sigma y^2 = 199549$

$$\bar{x} = \frac{\Sigma x}{n} = \frac{956}{12} = 79.66$$

$n = 12$

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

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

$$b = \frac{12(117589) - (956)(1347)}{12(78730) - (956)^2}$$

$$b = \frac{1411068 - 1287732}{944760 - 913936}$$

$$\frac{12822950}{30824}$$

$$b = 416.005$$

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

$$a = 112.25 - 4160.005(79.66)$$

$$a = -331273.74$$

$$\bar{y} = a + bx$$

$$\boxed{\bar{y} = -331273.74 + 416.005x}$$

Regression line Equation

(B) Coefficient correction Y on X

$$r = \frac{n\Sigma xy - \Sigma x \Sigma y}{\sqrt{12\Sigma x^2 - (\Sigma x)^2 \, n\Sigma y^2 - (\Sigma y^2)}}$$

$$r = \frac{12(117589) - (956)(1347)}{\sqrt{12(78730) - (956)^2 \, 12(199549)(1347)}}$$

$$= \frac{123356}{\sqrt{\quad}}$$

$$r = \boxed{\quad}$$

Qno 2

(A)

A box contains 4 red 4 white and 5 green balls. Three balls are drawn from the box together. find the probability that they may be (i) all of diffrevint colours, (ii) all of same colours.

Solution:-

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

4 - R
4 - W
5 - G
13 - balls

Let A = Denote all balls are of diffrevent colours

$$n(A) = \binom{4}{1}\binom{4}{1}\binom{5}{1} = 4 \times 4 \times 5 = 8$$

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

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

even x even x even = even $\quad$ odd x even x even = even

$3 \times 3 \times 2 = 18$

odd x odd x even = even

⇒ Interpretation: There are 28% chances that all balls are of diffrevent colour.

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

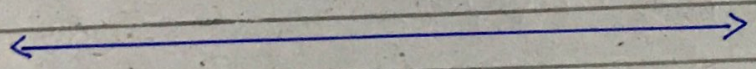
Red White Green

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

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

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

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



Qno 2
(B):-

Of 12 eggs in 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:-

2 - B
10 - 0
12 - Egg

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

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 one Egg is bad

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

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

$$= 2 \times 120 + 1 \times 45 = 240 + 45 = 285$$

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

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

Qno 3

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

A	12	15	6	73	7	87	199	36	84	29
B	47	12	76	48	4	87	37	48	13	3
C	15	23	52	4	24	87	74	52	13	4

(a) Find the range of batsmen A, B and C?
(b) Who is more consistant player?
(c) Compare A with B, B with C and A with C?

A	B	C
12	47	15
15	12	23
6	76	52
73	48	4
7	4	24
87	87	87
199	37	74
36	48	52
84	13	13
29	3	4

Range = $X_m - X_o$

Range of A = $X_m - X_o$
= 199 - 6
= 193

Range of B = $X_m - X_o$

= 87 - 3

= 84

Range of C = $X_m - X_o$

= 87 - 4

= 83

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
87	7569	87	7569	87	7569
199	39601	37	1367	74	5476
36	1296	48	2304	52	2704
84	7056	13	169	13	169
29	841	3	9	4	16
$\Sigma x = 548$	$\Sigma x^2 = 62146$	$\Sigma y = 375$	$\Sigma y^2 = 21867$	$\Sigma z = 348$	$\Sigma z^2 = 19484$

Batsman A =

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

$$\frac{548}{10} = 54.8$$

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

$$= \sqrt{\frac{62146}{10} - \left(\frac{548}{10}\right)^2}$$

$$S_x = 56.67$$

$$C.V = \frac{56.67}{X} \times 100 = \frac{56.67}{54.8}$$

$$C.V = 1.034 \times 100$$

$$C.V = 103.4$$

Batsman B

$$Y = \frac{\Sigma y}{n} = \frac{375}{10} = 37.5$$

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

$$= \sqrt{\frac{21867}{10} - \left(\frac{375}{10}\right)^2}$$

$$= \sqrt{2186.7 - 1406.25}$$

$$= 27.93$$

$$C.V = \frac{27.93}{37.5} \times 100$$

$$= 74.48$$

Batsman C

$$z = \frac{\Sigma z}{n} = \frac{348}{10} = 34.8$$

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

$$= \sqrt{\frac{19984}{10} - \left(\frac{348}{10}\right)^2}$$

$$= \sqrt{1998.4 - 1211.04}$$

$$= \sqrt{787.36}$$

$$= 28.05$$

$$C.V = \frac{S_D}{\bar{x}}$$

$$= \frac{28.05}{34.8} \times 100$$

$$= 80.60$$

Batsman B is more ~~constant~~ ~~as~~ consistant as its value of coefficient of varience is smallest

Compare A with B
B is cosistant

Compare B with A

B is more consistant

Compare A with C
C is more consistant.