NASRULLAH

7870

B

PROBABILITY AND STATISTICS

SIR DANIAL SHAMIM

09/23/2020

Q NO1

Compute and analyze the result of the least square regression equation and coefficient of correlation of Y on X for the following Data compare your manual result with the out come of spss ?

Temperature	53	62	57	71	78	70	86	87	96	91	94	94
Chirps per minute	20	32	45	60	80	100	120	140	160	180	200	210

QNO1

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
70	100	7000	4900	10000
86	120	10320	7396	14400
87	140	12180	7596	19600
96	160	15360	9216	25600
91	180	16380	8281	32400
94	200	18800	8836	40000
94	210	11280	8836	44100
Σ959	Σ1347	Σ107429	Σ76061	Σ199549

$$y = a + bx \quad \text{— (i)}$$

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

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

$$\bar{x} = \frac{\Sigma x}{n} = \frac{939}{12} = 78.25 \quad \text{— (iv)}$$

where

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

$$b = \frac{12[107429] - [1264833]}{12[76061] - [881721]}$$

$$\boxed{b = 0.7840} \quad \text{— (v)}$$

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

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

$$= 112.25 - 0.7840\,(78.25)$$

$$\boxed{a = 50.90}$$

Hence the desired estimated regression line y on x is

$$\hat{y} = 50.90 + 0.7840$$

The estimated regression coefficient $b = 0.7840$, which indicat that the values of Y increas by 0.7840 units for a unit increas in x.

Now co-efficient of co-relation

As we know

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

$$\gamma = \frac{(107429) - \frac{(939)(1347)}{12}}{\sqrt{(76061) - \left[\frac{(939)^2}{12}\right]\left[199549 - \frac{(1347)^2}{12}\right]}}$$

$$\gamma = \frac{2626.25}{\sqrt{(76061) - \left[\frac{(939)^2}{12}\right]\left[199549 - \frac{(1347)^2}{12}\right]}}$$

$$\boxed{\gamma = 0.660016}$$

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 may be (i) all of Different Colours (ii) all of the same Colours.

7870

Q2 (A)

Solution

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

let A = Donate all balls are Different Colours.

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

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

(ii)

let B = Donate all balls of same Colours. Red White Green

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

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

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

Q No(2)

(B) of 12 eggs in a refrigerator, 2 are bad. From these, 4 are choosen at random to make a cake. What are the probability that (i) exactly one is bad (ii) At Least one is bad?

7870

Q no(2)

(B)

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

Let A = Donate the event the exactly one egg is bad.

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

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

(ii) Let B = be the event at Least one egg is bad is selected.

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

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

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

Q No(03)

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

A	12	15	6	73	7	70	199	36	84	29
B	47	12	76	48	4	70	37	48	13	3
C	15	23	52	4	24	70	74	52	13	4

(A) Find the range of batsmen A, B & C?

(B) Who is more consitant player

(C) Compare A with B, B with C & A with C?

Solution

A	B	C
12	47	15
15	12	23
6	76	52
73	48	4
27	4	24
70	70	70
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 $= X_m - X_0$

$= 88 - 3$

$= 85$

Range of C = Xm - Xo

= 88 - 4

= 84

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
70	49	4	16	24	576
70	4900	70	4900	70	4900
199	36601	37	1369	74	5476
36	1296	48	2304	52	2704
84	7056	13	169	13	169
29	841	3	9	4	16
$\Sigma x = 531$	$\Sigma x^2 = 59477$	$\Sigma y = 358$	$\Sigma y^2 = 19200$	$\Sigma z = 331$	$\Sigma z^2 = 17315$

BATSMAN A

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

$$= \frac{531}{10} = 53.1$$

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

$$= \sqrt{\frac{59477}{10} - \left(\frac{531}{10}\right)^2}$$

$$S_{\bar{x}} = 55.92$$

$$C.V = \frac{55.92}{\bar{x}} \times 100 = \frac{55.92}{53.1} \times 100$$

$$\boxed{C.V = 105.31\%}$$

BATSMAN B

$$\bar{y} = \frac{\Sigma y}{n} = \frac{358}{10} = 35.8$$

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

$$= \sqrt{\frac{19200}{10} - \left(\frac{358}{10}\right)^2}$$

$$= 25.26$$

$$C.V = \frac{25.26}{35.8} \times 100$$

$$= 70.76\%$$

BAISMANC

$$\bar{z} = \frac{\Sigma z}{n} = \frac{331}{10} = 33.1$$

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

$$= \sqrt{\frac{17315}{10} - \left(\frac{331}{10}\right)^2}$$

$$= 25.21$$

$$C.V = \frac{25.24}{33.1} \times 100$$

$$= 1.$$

76.25%.

⇒ A is value of B is less so B is more consistant.

⇒ A with B, B is more consistant

⇒ B with C, B is more consistant

$\Rightarrow$ A with C, C is more consistent.