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Q NO 1 ⇒ Compute and analyse the results of the least square regression equation and coefficient of correlation of Y on X for the following data. Compare your manual results with the outcome of SPSS?

Temperature	53	62	57	71	78	77	86	87	96	91	94	94
Chirps per minute	20	32	45	60	80	100	120	140	160	180	200	210

The estimated regression line of Y on X is

$$(\hat{Y} = a + bx_i)$$

and the two normal equation are

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

$$\Sigma XY = a\Sigma X + b\Sigma X^2$$

To Compute the necessary summations, we arrange the computations in the table blow:

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
77	100	7700	5929	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
Total	946	1347	$\Sigma xy = 116598$	$\Sigma x^2 = 77090$	$\Sigma y^2 = 199549$

Now: $\bar{X} = \frac{\Sigma x}{n} = \frac{946}{12} = \boxed{78.83}$

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

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

$$b = \frac{12(116598) - (946)(1347)}{12(77090) - (946)^2}$$

$b = 4.14$

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

$a = 112.25 - (4.14)(78.83)$

$a = -214.11$

Co-efficient of Correction

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

$$r = \frac{12(115698 - (946)(1347}{12(77090) - (946^2)12(199549 - (1347)^2}$$

$$r = \frac{114114}{22100015}$$

$r = 5.16 \times 10^{-3}$

Q no 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 different colours, (ii) all of the same colours,

Sol

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

(i) Let: A = Denote all balls are of different colours.

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

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

$2 \times 2 \times 2 = 8$
even × even × even = even

$3 \times 2 \times 2 = 12$
odd × even × even = even

$3 \times 3 \times 2 = 18$
odd × odd × even = even

Interpretation => There are 28% Chances that all balls are of different colours.

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

Red White Green

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

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

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

Interpretation

There are 6.3% Chances that all balls of 7 Same Colours.

Q#02B) ⇒ 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 on is bad?

Sol ⇒

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

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 exactly one egg is bad.

ii) Let B = be the event that at least one bad egg is Selected.

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

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

(7)

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

Interpretation =>

There are 58% Chance that at least one bad egg is selected.

Q No3 => The following are the scores made by three batsmen A, B and C in a series of Innings.

A	12	15	06	73	7	77	199	36	84	29
B	47	12	76	48	4	77	37	48	13	3
C	15	23	52	4	24	77	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?

Sol =>

A	B	C
12	47	15
15	12	23
6	76	52
73	48	4
7	4	24
77	77	77
199	37	74
36	48	52
84	13	13
29	3	4

Rang = $X_m - X_o$

Range of A = $A = X_m - X_0$

$= 199 - 6 = 193$

Rang of B = $X_m - X_0$

$= 77 - 3 = 74$

Rang of C = $X_m - X_0$

$77 - 4 = 73$

Bastmen A		Bastmen B		Bistamen 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
77	5929	77	5929	77	5929
199	39601	37	1369	74	5476
36	1296	48	2304	52	2704
84	7056	13	169	13	169
29	841	3	9	4	16
$\Sigma x = 538$	$\Sigma x^2 = 60506$	$\Sigma Y = 365$	$\Sigma Y^2 = 20229$	$\Sigma Z = 338$	$\Sigma z^2 = 18344$

Basteners A =

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

$$\frac{538}{10} = 53.8$$

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

$$= \sqrt{\frac{60506}{10} - \left(\frac{538}{10}\right)^2}$$

$$\bar{S}_x = 56.18$$

$$C.V = \frac{56.18}{x} \times 100 = \frac{56.18}{53.8}$$

$$C.V = 1.04 \times 100$$

$$C.V = 104$$

Bastmen B

$$\bar{Y} = \frac{\Sigma Y}{n} = \frac{365}{10} = 36.5$$

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

$= 20229$

$$= \sqrt{\frac{20229}{10} - \left(\frac{365}{10}\right)^2}$$

$$\sqrt{2022.9 - 1332.25}$$

$= 26.28$

$$C.V = \frac{26.28}{36.5} \times 100$$

$= 72\%$

Bastemen C

$$\bar{z} = \frac{\Sigma z}{n} = \frac{338}{10} = 33.8$$

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

$$\sqrt{\frac{18344}{10} - \left(\frac{338}{10}\right)^2}$$

$$\sqrt{1834.4 - 1142.44}$$

$$26.30$$

$$C.V = \frac{S_z}{\bar{z}} = \frac{26.30}{33.8} \times 100$$

$$C.V = 77.81$$

Bastemen B is more Consistant as it value ~~is Smallest~~ of Co-efficient of Varience is Smallest.

Compare A with B

B is Consistant

Compare B with C

B is more Consistant

Compare A with C

C is more Consistant.