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Section	A
Subject	Probability and Statistics
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Q No 1

Compute analyse the result of the least square regression equation and coefficient correlation of y on x for the following data. Compare your manual result with the outcome of SPSS?

Temperature	53	62	57	71	78	28	86	87	96	91
Chirps per minute	20	32	45	60	80	100	120	140	160	180

94	94
200	210

The estimated regression line of y on x is

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

and two normal equation are

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

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

To compute the necessary summation we arrange the computation in given Table.

x	y	xy	x^2
53	20	1060	2809
62	32	1984	3844
57	45	2565	3249
71	60	4260	2601
78	80	6240	6084
28	100	2800	784
86	120	10320	7396
87	140	12180	7469
96	160	15360	9210
91	180	16380	8281
94	200	18800	8836
94	210	19740	8836
$\Sigma x =$ 897	$\Sigma y =$ 1347	$\Sigma xy =$ 111689	$\Sigma x^2 =$ 69399

Now

$$\bar{x} \quad \frac{\Sigma x}{n} = \frac{897}{12}$$

$$\bar{x} = 74.75$$

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

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

$$b = \frac{12(111689) - (897)(1347)}{12(69399) - (897)^2}$$

$$\boxed{b = 4.68}$$

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

$$a = 112.25 - 4.68(74.75)$$

$$\boxed{a = -237.58}$$

Hence the desired estimated regression equation appropriate predicting the Y, given the x.

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

$$r = \frac{111689 - \frac{(897)(1347)}{12}}{\sqrt{\left[69399 - \left[\frac{897}{12}\right]\right]\left[199549 - \frac{1347}{12}\right]}}$$

$$r = \frac{11000.75}{\sqrt{(63811.43)(199436.75)}}$$

So $\boxed{r = 0.0975}$ is co-efficient of correlation.

Q NO 2 (a)

A box contains 4 red, 4 White 5 green ball. Three balls are down from the box together. Find the probability they may be (i) All of different colour (ii) All of same colour

Solution :-

The total number of possible equally out comes in S is $n(S) = \binom{13}{3}$

$$n(S) = \frac{13!}{3!(13-3)!}$$

$$n(S) = 286$$

(i) Let X represents "All of different colour"

$$n(X) = \binom{4}{1}\binom{4}{1}\binom{5}{1}$$

$$n(X) = (4)(4)(5)$$

$$n(X) = 80$$

So the possibility is ;

$$P(x) = \frac{n(x)}{n(s)}$$

$$P(x) = \frac{80}{286}$$

$$\boxed{P(x) = 0.28}$$

(ii) let y represents "All of same colour"

$$n(y) = \binom{4}{3} + \binom{4}{3} + \binom{5}{3}$$

$$n(y) = \frac{4!}{3!(4-3)!} + \frac{4!}{3!(4-3)!} + \frac{5!}{3!(5-3)!}$$

$$n(y) = 4 + 4 + 10$$

$$n(y) = 18$$

So probability is

$$P(y) = \frac{n(y)}{n(s)}$$

$$P(y) = \frac{18}{286}$$

$$\boxed{P(y) = 0.063}$$ Ans

Q No2 (b)

Of 12 eggs in refegerator, 2 are bad. From these, 4 eggs are chosen at random to make a cake. What are possibalities that i) exactly one is bad; ii) At Least one is bad?

Solution :-

The total number of possible equally likely outcomes in S is

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

$$n(S) = \frac{12!}{4!(12-4)} = 495$$

i) Let x repsents "Exactly one is bed

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

$$n(x) = \left(\frac{2!}{2!(2-1)}\right)\left(\frac{10!}{3!(10-3)!}\right)$$

$$n(x) = 2(120)$$

$$n(x) = 240$$

So the possibality is;

$$P(x) = \frac{n(x)}{n(s)} = \frac{240}{495}$$

$$P(x) = 0.48$$

(ii) Let "Y" represents (At Least one is bad)

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

$$n(Y) = \left(\frac{10!}{3!(10-3)!}\right)\left(\frac{2!}{1!(2-1)!}\right) + \left(\frac{10!}{2!(10-2)!}\right)\left(\frac{2!}{2!(2-2)!}\right)$$

$$n(Y) = (120)(2) + 45(1)$$

$$n(Y) = 240 + 45$$

$$n(Y) = 285$$

So the poobability is

$$P(Y) = \frac{n(Y)}{n(s)}$$

$$P(Y) = \frac{285}{495}$$

$$\boxed{P(Y) = 0.58}$$

Q No # 3

The following are the scores made by three batsman A, B, and C in a series of 10 innings

A	12	15	6	73	7	28	199	36	84	29
B	47	12	76	48	4	28	37	48	13	3
C	15	23	52	4	24	28	74	52	13	4

(a) Range of Batsman A, B and C:

Range of A

A = 12, 15, 6, 73, 7, 28, 199, 36, 84, 29

Largest value in data L = 199
Smallest value in data = S = 6

Range of B:

B = 47, 12, 76, 48, 4, 28, 37, 48, 13, 3

Largest value in data = 76
Smallest value in data = 3

Range = L - S

76 - 3

Range = 73

Range of C:

C = 15, 23, 52, 4, 24, 28, 74, 52, 13, 4

Largest value in data L = 74

Smallest value in data S = 4

Range = L - S

74 - 4

= 70

Part (b)

More consistance Player = I

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
28	784	28	784	28	784
199	39601	37	1369	74	5476
36	1296	48	2304	52	2704
84	7056	13	169	13	169
29	841	3	9	4	16
$\Sigma x =$	$\Sigma x^2 =$				
489	55361	$\Sigma y = 316$	$\Sigma y^2 =$ 15084	$\Sigma z =$ 289	Σz^2 1319

Batsman :. A $n = 10$

$$\bar{x} = \frac{\Sigma x}{n} \qquad \frac{489}{10} = \frac{489}{10}$$

$$\boxed{\bar{x} = 48.9}$$

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

$$= \sqrt{\frac{55361}{10} - \left(\frac{489}{10}\right)^2}$$

$$\sigma x = 56.07$$

$$C.V = \frac{\sigma x}{x} = \frac{56.07}{48.9} = 1.146$$

$$C.V = 1.14 \times 100$$

$$\boxed{C.V = 114.68}$$

Batsman B :-

$$\bar{x} = \frac{\Sigma y}{n} = \frac{316}{10} = 31.6$$

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

$$\Sigma y = \sqrt{\frac{15084}{10} - \left(\frac{316}{10}\right)^2}$$

$$\boxed{\Sigma y = 22.57}$$

$$C.V = \frac{22.57}{} \times 100 \qquad \boxed{C.V = 225.7}$$

Batsman C

$$\bar{z} = \frac{\Sigma z}{n} = \frac{289}{10} = 28.9$$

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

$$= \sqrt{\frac{13199}{10} - \left(\frac{289}{10}\right)^2}$$

$$= \sqrt{\frac{13199}{10} - 835.21}$$

$$\boxed{S_z = 22.01}$$

$$C.V = \frac{S_z}{\bar{z}} \quad \frac{22.01}{28.9}$$

$$C.V = 0.761 \times 100$$

$$\boxed{C.V = 76.15}$$

Q=3 part (c)

Comparison

Compare A with B

A is consistence

Compare B with A

A is more consistence

Compare A with C

C is more consistence