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PAPER PROBIBILITY

SUBMITTED TO ENGR. ANWAR SHAMIM

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QUESTION 1:

compute and analyze the result of the least square regression equation and co-efficient of correlation of Y on X for the following data. compare your manual results with the outcome of spss?

Last digits of your ID NO.

Temperature	53	62	57	71	78	14	86	87	96	91	94	90
chirps per minute	20	32	45	60	80	100	120	140	160	180	200	210

Solution:

(A) atleast. Square regression Equation

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

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

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

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
14	100	1400	196	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
$\Sigma x = 883$	$\Sigma y = 1347$	$\Sigma xy = 110289$	$\Sigma x^2 = 70857$	$\Sigma y^2 = 199549$

$$\bar{x} = \frac{\Sigma x}{n} \qquad n = 12$$

$$= \frac{883}{12} = 73.58$$

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

$$= \frac{1347}{12} = 112.25$$

(A) At least square regression equation

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

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

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

$$b = \frac{12(117889) - 959(1347)}{12(70957) - 199549}$$

$$b = \frac{1323468 - 1291773}{851484 - 199549}$$

$$\boxed{b = 199548.96}$$

or

$$\boxed{b = 1.995}$$

$$a = \bar{Y} - bx$$

$$a = 112.25 - 3.90\ (79.92)$$

$$\boxed{a = -31056.65}$$

$$Y = a + bx$$

$$\boxed{Y = -31056.65 + 3.90x}$$

(B) Co-efficient Correlation Y ON X :

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

$$r = \frac{12(117889) - 959\ (1347)}{\sqrt{951132 - 919681)(239458 - 1814409)}}$$

$$\boxed{r = 0.90}$$

Hence the estimated regression cofficient $b = 3.90$ which indicates that value of y increase by 3.90. Unit of increase in X.

Q no 2:

a) A box contain 4 red, 4 white and 5 green balls. Three balls are drawn From the box together. Find the propability that they may be (i) all of different colours (ii) all of the same colours

ANSWER: As

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

4 – R
4 – W
5 – G
13 – Balls

Suppose,

A = Denote all balls are of different colours.

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

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

$2 \times 2 \times 2 = 8$	$3 \times 2 \times 2 = 12$	$3 \times 3 \times 2 = 18$
even x even x even = even	odd x even x even = even	odd x odd x even = even

Interpretation:

There are 28 % chances that all balls are of different colours

Let B = Denote all balls of same colours.

RED WHITE GREEN

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

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

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

$$\boxed{P(B) = 0.063 .}$$

Q NO 2:

(B) : Of 12 egg's in a refrigerator, 2 are bad. From these, 4 eggs are chosen at random to make a cake. What are the propabilities that (i) exactly one is bad? (ii) At least one is bad?

ANSWER: As

2 – B
10 – G
12 – Eggs

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

Let A = denote the event that exactly one egg is bad.

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

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

Now;

INTERPRETATION:

There ave 48 % chances that exactly one egg is bad.

Let B = be the event that atleast one bad egg is selected.

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

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

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

$$\boxed{P(B) = 0.58 \ .}$$

QUESTION NO 3:

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

						Last 2 digits of YOUR ID NO				
A	12	15	6	73	7	14	199	36	84	29
B	47	12	76	48	4	14	37	48	13	3
C	15	23	52	4	24	14	74	52	13	4

(a) Find the range of batsman A, B, 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
14	14	14

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 = $X_m - X_o$

$= 176 - 3$

$= 173$

Range of C = $X_m - X_0$

$= 174 - 4 = 170$

$= 170$

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
14	196	14	196	14	196
199	39601	37	1367	74	5476
36	1296	48	2304	52	2704
84	7056	13	169	13	164
29	841	3	9	4	16
$\Sigma x = 475$	$\Sigma x^2 = 54773$	$\Sigma y = 302$	$\Sigma y^2 = 14494$	$\Sigma z = 275$	$\Sigma z^2 = 12606$

Batsman A:

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

$$= \frac{475}{10}$$

$$= 47.5$$

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

$$= \sqrt{\frac{54773}{10} - \left(\frac{475}{10}\right)^2}$$

$$= \sqrt{5477.3 - 2256.25}$$

$$= \sqrt{3221.05}$$

$$S_x = 56.75$$

$$C.V = \frac{56.75}{x} \times 100 = \frac{56.75}{54.9}$$

$$C.V = 1.03 \times 100$$

C.V = 103.31

BATSMAN B :

$$\bar{Y} = \frac{\Sigma Y}{n} = \frac{302}{10} = 30.2$$

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

$$= \sqrt{\frac{14494}{10} - \left(\frac{302}{10}\right)^2}$$

$$= \sqrt{1449.4 - 912.04}$$

$$= \sqrt{573.36}$$

$$= 23.1810$$

$$C.V = \frac{23.18}{30.2} \times 100$$

$$C.V = 76.75.$$

BATSMAN C:

$$\bar{z} = \frac{\Sigma z}{n} = \frac{275}{10} = 27.5$$

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

$$= \sqrt{\frac{12606}{10} - \left(\frac{275}{10}\right)^2}$$

$$= \sqrt{1260.6 - 756.25}$$

$$= \sqrt{504.35}$$

$$= 22.45$$

$$C.V = \frac{22.45}{27.5} \times 100$$

$$C.V = 81.63$$

Batsman B is more consistant as its values of co-efficient of variance is smallest.

Compare A with B

B is consistant

Compare B with A

B is more consistant

Compare A with C

C is more consistant.
