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Subject : Probability and Statistics

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Q (1)

Solution:

x	y	xy	x^2
53	20	1060	2809
62	32	1984	3844
57	45	2565	3249
71	60	4260	5041
78	80	6240	6084
86	100	8600	7396
86	120	10320	7396
87	140	12180	7596
96	160	15360	9216
91	180	10380	8281
94	200	18600	8830
94	210	11280	8836
$\Sigma 955$	$\Sigma 1347$	$\Sigma 102,829$	$\Sigma 78,578$

$$y = a + bx \quad -(i)$$

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

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

$$\bar{x} = \frac{\Sigma x}{n} = \frac{955}{12} = 79.583 \rightarrow (iv)$$

Where,

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

$$b = \frac{12(102,829) - (1,286,385)}{12(78,578) - (912025)}$$

$$\boxed{b = -1.6963864} \rightarrow (v)$$

Putting equ (iii), (iv) & (v) in equ (i)

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

$$a = 112.25 - (-1.6963864)(79.583)$$

$$\boxed{a = 247.2535189}$$

Hence, the desired estimated regression line y on x is

$$\hat{y} = 247.2535189 + (-1.6963864)$$

The estimated regression Co-efficient $b =$, which indicates that the values of y increases by -1.6963864 units for a unit increases in x.

Q 2
Part (A)

Solution:-

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

Let, A = Denote all balls are of different colours.

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

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

There are 48% chances that exactly 1 egg is bad.

(ii) Let, B = Denote all balls of Same colours. Red White Green

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

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

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

Thus, There are 58% chances that at least one bad egg is selected.

Q 2

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

Let, A = Denote the event the exactly one egg is bad.

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

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

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

(ii)

Let, B = Denote the event at least one bad egg is selected.

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

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

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

There are 63% chances that all balls of same colour.

Q 3

Solution

A	B	C
12	47	15
15	12	23
6	76	52
73	48	4
7	4	24
86	86	86
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 = $X_m - X_o$

= 88 − 3

= 85

Range of C = $X_m - X_o$

= 88 − 4 = 84

P#06

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
86	7396	86	7396	86	7396
199	39601	37	1369	74	5476
36	1296	48	2304	52	2704
84	7056	13	169	13	169
29	841	3	9	4	16
$\Sigma x = 547$	$\Sigma x^2 = 61973$	$\Sigma y = 374$	$\Sigma y^2 = 21696$	$\Sigma z = 347$	$\Sigma z^2 = 19811$

Batsman A.

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

$$= \frac{547}{10}$$

$$\bar{x} = 54.7$$

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

$$S_x = \sqrt{\frac{(61973)^2}{10} - \left(\frac{547}{10}\right)^2} = 56.614$$

P#07

~~C.V = 19~~

$$C.V = \frac{56.614}{54.7} \times 100$$

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

$$C.V = 103.4$$

Batsman B:

$$\bar{Y} = \frac{\Sigma Y}{n} = \frac{374}{10} = 37.4$$

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

~~$SY = \sqrt{\frac{374}{n} - ($~~

$$SY = \sqrt{\frac{21696}{10} - \left(\frac{374}{10}\right)^2}$$

$$SY = 27.764$$

$$C.V = \frac{27.764}{37.4} \times 100$$

$$C.V = 74.235$$

Batsman C:

$$\bar{z} = \frac{\Sigma z}{n} = \frac{347}{10} = 34.7$$

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

$$S_z = \sqrt{\frac{19811}{10} - \left(\frac{347}{10}\right)^2}$$

$$S_z = 27.874$$

$$C.V = \frac{27.874}{34.7} \times 100$$

$$C.V = 80.328$$

Batsman B is more Consistant as it value of Co-efficient of varience 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.