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Q#02

Sol:-

As we know that

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

let A = Denote all balls are of different colours

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

$$\Rightarrow 4 \times 4 \times 5 = 80$$

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

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

4 - 12
4 - W
5 - G

13 - balls

Interpretation:- There are 28% chances that all ball are off different colours

(ii) let B = Denote all balls are same colours.

$$n(B) = \binom{4}{3}_{\text{Red}} \text{ or } \binom{4}{3}_{\text{White}} \text{ or } \binom{5}{3}_{\text{Green}}$$

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

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

Interpretation:- There are 6.3% chances that ball are same colours.

part B:

Sol:

As we know that

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

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

2 - B
10 - C
12 - Egg

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

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

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.

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

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

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

Interpretation: There are 58% chances that at least one bad egg is selected.

Q#03:

Following are the score made by batsmen A, B and C

A = 12, 15, 6, 73, 7, 62, 199, 36, 84, 29

B = 47, 12, 76, 48, 4, 62, 37, 48, 13, 3

C = 15, 23, 52, 4, 24, 62, 74, 52, 13, 4

Find the Range of A, B and C

who is more constant

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
62	62	62
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 = $x_m - x_0$

$= 88 - 4$

$= 84$

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
7	49	4	16	24	576
62	3844	62	3844	62	3844
199	39601	37	1369	74	5476
36	1296	48	1204	52	2704
84	7056	13	169	13	169
29	841	3	9	4	16
$\Sigma X = 523$	$\Sigma X^2 = 58421$	$\Sigma X = 350$	$\Sigma Y^2 = 17044$	$\Sigma Z = 323$	$\Sigma Z^2 = 16259$

Batsman A=

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

$$\bar{x} = \frac{523}{10} \Rightarrow 52.3$$

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

$$\Rightarrow \sqrt{\frac{58421}{10} - \left(\frac{523}{10}\right)^2}$$

$$S_{\bar{x}} = 55.73$$

$$C.V = \frac{55.73}{\bar{x}} = \frac{55.73}{52.3}$$

$$C.V = 1.06 \times 100$$

$$C.V = 106.55$$

Batsman B:

$$\bar{y} = \frac{\Sigma y}{n} = \frac{350}{10} \Rightarrow 35$$

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

$$\Rightarrow \sqrt{\frac{17044}{10} - \left(\frac{350}{10}\right)^2}$$

$$S_y = 21.895$$

C.V

$$\frac{21.895}{52.3} = 0.4186 \times 100$$

C.V $\Rightarrow$ $\Rightarrow 41.86\ \%$

Batsman C:

$$\frac{\Sigma z}{n} = \frac{323}{10} \Rightarrow 32.3$$

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

$$Sz = \sqrt{\frac{16259}{10} - \left(\frac{323}{10}\right)^2}$$

$$Sz = 24.137$$

$$C.V = \frac{24.137}{52.3}$$

$$C.V = 0.4615 \times 100$$

$$C.V = 46.15$$

Batsmen B is more constant

as it value of coefficient of variance is smallest

Compare A with B

B is constant

Compare B with A

B is more constant

Compare A with C

C is more constant.

Q #01 :

Sol

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

The estimate regression line of Y on X is

Table

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
62	100	6200	3844	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
931	1347	115089	75005	199549

Now $\bar{x} = \frac{\Sigma x}{n} = \frac{931}{12} = 77.58$

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

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

$$\Rightarrow \frac{12(115089) - (931)(1347)}{12(75005) - (931)^2}$$

$b \Rightarrow 3.81$

and

$a = \bar{y} - b\bar{x} \Rightarrow 112.25 - (3.81)(73.58)$

$a = -168.08$

Hence the desire estimate regression line of y on x is

$$\hat{y} = -168.08 + 3.81$$

The estimate regression line coefficient $b = 3.81$ which indicate the value of y increase by units for a units increase in (x)
3.81

part 13:

Coefficient correlation Y on X

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

$$r = \frac{12(115089) - (931)(1347)}{\sqrt{12(75005) - (931)^2}\, 12(199509) - (1347)^2}$$

$$r = \frac{127011}{\sqrt{(900060 - 866761)(580179)}}$$

$$r = \frac{127011}{83299 \times 580179}$$

$$r = \frac{127011}{\sqrt{193193805}}$$

$$r = \frac{127011}{13899.41}$$

$$r = 9.137$$

Hence the regression estimate coefficient $b = 3.81$ which is include that we is the value of Y is increased by 3.81 units of increase (X).