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# Question 1

Solution

| $X$ | $Y$ | $XY$ | $X^2$ |
|---|---|---|---|
| 53 | 20 | 1060 | 2809 |
| 62 | 32 | 1984 | 3844 |
| 57 | 45 | 2565 | 3249 |
| 71 | 60 | 4260 | 6084 |
| 78 | 80 | 6240 | 6084 |
| 72 | 100 | 7200 | 5184 |
| 86 | 120 | 10320 | 7396 |
| 87 | 140 | 12180 | 7569 |
| 96 | 160 | 15360 | 9216 |
| 91 | 180 | 16380 | 8281 |
| 94 | 200 | 18800 | 8836 |
| 94 | 210 | 11280 | 8836 |
| $\Sigma$ 941 | $\Sigma$ 1347 | $\Sigma$ 107629 | $\Sigma$ 76345 |

$$y = a + bx \quad \text{— (i)}$$

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

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

$\bar{x} = \frac{\Sigma x}{n} = \frac{941}{12} = 78.41$ — (iv)

where

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

$$b = \frac{12\,(107629) - 941 \times 1347}{12\,(76345) - 885481}$$

$$\boxed{0.783} \quad \text{---} \quad (v)$$

Putting eq (iii), (iv) & (v) in eq (ii)

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

$$a = 112.25 - 0.783 \times 78.41$$

$$\boxed{a = 50.85}$$

Hence the derived estimated regression line $y$ on $x$ is

$$\hat{y} = 50.85 + 0.783x$$

The estimated regression Co-efficient $b = 0.783$ which indicates that the value of $y$ increases by 0.783 units for a unit increase in $x$.

# Question # 2

## Part (a)

Solution

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

Let A = Denote all balls are of different Colours.

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

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

| | | |
|---|---|---|
| $2 \times 2 \times 2 = 8$ | $3 \times 2 \times 2 = 12$ | $3 \times 3 \times 2 = 18$ |
| 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.

(ii) let B = Denote all balls of Same Colours

Red White Green

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

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

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

Interpretation: There are 6.3 chances that all balls of Same Colours.

# Question no 2

## Part (b)

Solution:

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

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

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

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

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

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

# Question no 3

Solution

| | A | B | C |
|---|---|---|---|
| | 12 | 47 | 15 |
| | 15 | 12 | 23 |
| | 6 | 76 | 52 |
| | 73 | 48 | 4 |
| | 7 | 4 | 24 |
| (ID) | 72 | 72 | 72 |
| | 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 = $x_m - x_o$

= 72 - 3

= 69

Range of C : $x_m - x_o$

$= 72 - 4$

$= 68$

| 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 |
| 72 | 5184 | 72 | 5184 | 72 | 5184 |
| 199 | 39601 | 37 | 1369 | 74 | 5476 |
| 36 | 1296 | 48 | 2304 | 52 | 2704 |
| 84 | 7056 | 13 | 169 | 13 | 169 |
| 29 | 841 | 3 | 9 | 4 | 16 |
| $\Sigma x = 533$ | $\Sigma x^2 = 59761$ | $\Sigma y = 360$ | $\Sigma y^2 = 14484$ | $\Sigma z = 333$ | $\Sigma z^2 = 17599$ |

Batsman A =

$\bar{x} = \frac{\Sigma x}{n} = \frac{533}{10}$

$= \boxed{53.3}$

Batsman B =

$$\bar{Y} = \frac{\Sigma Y}{n} = \frac{360}{10} = \boxed{36}$$

Batsman C :

$$\bar{Z} = \frac{\Sigma Z}{n} = \frac{333}{10} = \boxed{33.3}$$

For Batsman A :-

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

$$= \sqrt{\frac{5976}{10} - \left(\frac{533}{10}\right)}$$

$$\boxed{S_x = 55.99}$$

$$C.V = \frac{55.99}{53.3} \times 100$$

$$\boxed{= 103.18}$$

For Batsman B

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

$$S_Y = \sqrt{\frac{19484}{10} - \left(\frac{360}{10}\right)^2}$$

$$S_Y = \boxed{25.54}$$

$$C.V = \frac{25.54}{36} \times 100$$

$$= \boxed{70.94}$$

For Batsman C

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

$$S_Z = \sqrt{\frac{17599}{10} - \left(\frac{333}{10}\right)}$$

$$= \boxed{25.51}$$

$$C.V = \frac{S_z}{\bar{z}} = \frac{25.51}{33.3} \times 100$$

$$= \boxed{76.60}$$

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

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