Name: Keyur Patel

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Roll no: 16010421073
Batch: A-2
~~Tut 2: Written~~
Date: 9/2/23

Batch: A2 Roll No.: 16010421073
Experiment / assignment / tutorial No. 2
Grade: AA/ AB / BB / BC / CC / CD / DD

Signature of the Faculty In-Charge with date

Tut 2 :- Correlating regression lines.

(Q.10) Mean (x) = 30.1 = $\bar{x}$

Mean (Y) = 47.8 = $\bar{Y}$

S.D (x) = σ_x = 6.2

S.D (Y) = σ_y = 9.5

$r = 0.72$.

$$r = \frac{Cov(x, y)}{\sigma_x \times \sigma_y}$$

$0.72 \times 6.2 \times 9.5 = Cov(x, Y)$.

$42.408 = Cov(x, Y)$.

$$\frac{\sum (x-\bar{x})(y-\bar{y})}{n} = 42.408.$$

$42.408 - (34 \times 47) + (43 \times 74)$

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(Q. 27)

Student no	Accounting	R_1	Statistics	R_2	$\Sigma D^2 = (R_1 - R_2)^2$
1	45	3	35	1	4
2	70	7	90	6	1
3	65	6	70	4	4
4	30	1	40	2.5	2.25
5	90	8	95	7	1
6	40	2	40	2.5	0.25
7	50	4	60	3	1
8	57	5	80	5	0
					$\Sigma D^2 = 13.5$

$$R = 1 - \frac{6[\Sigma D^2 + cf]}{n(n^2-1)}$$

$\boxed{n = 8}$

$\boxed{m_1 = 2}$

$$= 1 - \frac{6[13.5 + 0.5]}{8^3 - 8}$$

so $cf = \frac{m_1(m_1^2 - 1)}{12}$

$$= \frac{m_1^3 - m_1}{12}$$

$$= \frac{8 - 2}{12}$$

$$= \frac{1}{2}$$

$$= 1 - \frac{6(14)}{}$$

$$= 1 - \frac{1}{6}$$

$$= \frac{5}{6}$$

$$\boxed{R = 0.833}$$

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(i) No the result will not change if we marks of two subjects of all students are incresed by 5 because Rank of each student will be same and their square of difference R_1 & R_2 will be same.
So there will be no change in Spearman's coefficient.
Here we are using $R(X, Y) = R(X \pm a, Y + b)$.
Change in origin which is valid for Spearmans coefficient of correlation.

ii) No the result will not change in this case because $R(X, Y) = R\left(\frac{X}{a}, \frac{Y}{b}\right)$ change of scale property.

(Q-3 a)

Subject 1	R_1	Subject 2	R_2	$D^2 = (R_1 - R_2)^2$
40	1	45	4	$(1-4)^2 = 9$
46	2	46	5	$(2-5)^2 = 9$
54	3	50	6	$(3-6)^2 = 9$
60	4	43	3	$(4-3)^2 = 1$
70	5	40	1	$(5-1)^2 = 16$
80	6	75	11	$(6-11)^2 = 25$
82	7	55	7	$(7-7)^2 = 0$
85	8	72	10	$(8-10)^2 = 4$
87	9	65	8	$(9-8)^2 = 1$
90	10	42	2	$(10-2)^2 = 64$
95	11	70	9	$(11-9)^2 = 4$
				$\Sigma D^2 = 142$

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$n = 11$

$$R = 1 - \frac{6 \Sigma D^2}{n(n^2-1)}$$

$$= 1 - \frac{6(142)}{11(11^2-1)}$$

$$= 0.354$$

$$\boxed{R = 0.354}$$

(Q.54) Equations of two lines of regression are

$9x + 10y - 67 = 0$ — ①
$5x + 2y - 23 = 0$ — ②

i) Mean values

$\bar{X} = ?$
$\bar{Y} = ?$

$\therefore$ $\bar{x} = 3$
$\bar{Y} = 4.$

Finding $\bar{x}$ & $\bar{y}$ by equating eq^n ① & ②.

$x = \frac{23 - 2y}{5}$

$9\left(\frac{23-2y}{5}\right) + 10y - 67 = 0$

$207 - 18y + 50y - 335 = 0$

$32y = 128$

$y = 4$

so $x = 3$

ii) Regression ~~correlation~~ coeff

Eq ①. (Rearrange)

$y = -\frac{9x}{10} + \frac{67}{10}$

so $b_{yx} = \frac{-9}{10}$

$b_{xy} = \frac{1}{\frac{-9}{10}}$

iii) Correlation coeff

$r = \sqrt{b_{yx} \cdot b_{xy}}$

$$\boxed{r = 1}$$