

Q No: - 01

By using the regression line  $\hat{y} = 1.7 + 1.98x$   
find the residual (error) values Error

x	y	$\hat{y}_i = 1.7 + 1.9x$	$y - \hat{y}_i$
-1	0	-0.2	0.2
0	2	1.7	0.3
1	4	3.6	0.4
2	5	5.5	-0.5

Q No: - 02

Using the data below, find centroid of data:-

x	y	$\bar{x} = \frac{1+2+3+4+5}{5}$
1	10	3
2	8	$\bar{x} = \frac{15}{5} = 3$
3	12	
4	16	$\bar{y} = \frac{10+8+12+16+20}{5} = 13.2$
5	20	

$$\text{Centroid} = (\bar{x}, \bar{y}) = (3, 13.2) \text{ A}$$

Q No: - 03

Determine the value of slope 'b' in the regression equation  $\hat{y} = a + bx$  by using the following data:-

$$\sum X = 1710, \sum Y = 760, \sum XY = 130628$$

$$\sum X^2 = 293162, n = 10$$

Solution:-

$$b = \frac{n(\sum XY) - (\sum X)(\sum Y)}{n(\sum X^2) - (\sum X)^2}$$

$$= \frac{10(130628) - (1710)(760)}{10(293162) - (1710)^2}$$

may assume? Interpret the meaning when  $r = -1$ ?

Solution:-

The values of simple correlation coefficient  $r$  ranges from  $-1$  to  $+1$ . When  $r = -1$  then that means the relationship is strong negative linear relationship between the variables.

Q No:- 20

Find the correlation coefficient of  $X$  and  $Y$  from the following data given below-

$\Sigma X = 156, \Sigma Y = 168, \Sigma XY = 3109, \Sigma X^2 = 3024, \Sigma Y^2 = 3294, n = 9.$

Solution:-

$$r = \frac{n(\Sigma XY) - (\Sigma X)(\Sigma Y)}{\sqrt{[n(\Sigma X^2) - (\Sigma X)^2][n(\Sigma Y^2) - (\Sigma Y)^2]}}$$

$$= \frac{9(3109) - (156)(168)}{\sqrt{[9(3024) - (156)^2][9(3294) - (168)^2]}}$$

$$= \frac{27981 - 26208}{\sqrt{(27216 - 24336)(29646 - 28224)}}$$

$$= \frac{1773}{\sqrt{(2880)(1422)}}$$

$$= \frac{1773}{\sqrt{4095360}}$$

$$= \frac{1773}{2023.7}$$

$r = 0.87$  A

$$b = \frac{25}{50} = 0.5$$

$$b = 0.5$$

$$a = \bar{Y} - b\bar{X}$$

$$= \left(\frac{9}{5}\right) - (0.5)\left(\frac{15}{5}\right)$$

$$= 1.8 - 1.5$$

$$a = 0.3$$

$$Y = a + bX$$

$$Y = 0.3 + 0.5X$$

Required regression line

Q No-6

In a study to determine the relationship between two variables, a coefficient of correlation of  $-0.90$  was obtained. What can you say about the relationship of these variables?

Solution:-

As we know that there are only two variables under study so there is simple linear relationship. Simple linear correlation ranges from  $-1$  to  $+1$ . As the calculated value is close to  $-1$  so we can say that there is strong negative relationship between the two variables.

Q No-7

Give examples of two variables that are positively correlated?

Solution:-

$$= \frac{1306280 - 1299600}{2931620 - 2924100}$$

$$= \frac{6680}{7520} = 0.888$$

$$b = 0.888$$

$$b = 0.888 \quad A$$

Q. No. - 04.

In a regression line, we computed  $SSE = 23.5$  and  $SST = 204.7$ . Find value of  $SSR$ .

Solution:-  $SST = SSR + SSE$

$$SST - SSE = SSR$$

$$SSR = 204.7 - 23.5$$

$$SSR = 181.2 \quad A$$

Q. No. - 05.

Find the least square regression line of  $Y$  on  $X$  for the given data:-

Solution:-

X	Y	$X^2$	$Y^2$	$XY$
1	1	1	1	1
2	1	4	1	2
3	2	9	4	6
4	2	16	4	8
5	3	25	9	15

$$Y = a + bX$$

$$a = \bar{Y} - b\bar{X}$$

$$b = \frac{n(\sum XY) - (\sum X)(\sum Y)}{n(\sum X^2) - (\sum X)^2}$$

$$= \frac{5(32) - (15)(9)}{5(55) - (15)^2} = \frac{160 - 135}{275 - 225}$$

Ghazi Paper

Height and weight of a data class.  
Hours of study and %<sup>grades</sup> got by students.

Q No:- 8.

Find the coefficient of rank correlation from the following ranking of 10 students in Statistics and Mathematics.

Solution:-

$$R = 1 - \frac{6 \sum d^2}{n(n^2-1)}$$

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Stat	Math	d	d <sup>2</sup>
6	5	1	1
7	8	-1	1
3	10	-2	4
9	6	3	9
10	9	1	1
			16

$$R = 1 - \frac{6(16)}{5(25-1)}$$

$$= 1 - \frac{96}{120}$$

$$= \frac{120-96}{120}$$

$$= \frac{24}{120}$$

$$R = 0.2 \quad \text{A}$$

Q No:- 9.

What values simple correlation coefficient r