

# UNIVERSITY OF KARACHI



## Probability and Statistical Methods

BSCS-306

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# ASSIGNMENT 11

## CORRELATION AND LINEAR REGRESSION MODELS :-

QUESTION : 01

We know that the fitted regression line is :

$$\hat{y} = b_0 + b_1 x$$

$$r = \text{Coefficient of correlation} = 0.989$$

$$b_1 = \text{slope} = 10.12$$

$$b_0 = y\text{-intercept} = 6.38$$

Relationship between income and percentage growth in wealth.

$$\hat{y} = 6.38 + 10.12x$$

$$\hat{y} = 10.12x + 6.38$$

Since  $x$  is greater than zero so it indicates positive relation.

QUESTION : 02.

$$\text{Sum of squared of } x = SS_x = 765.98$$

$$\text{Sum of squares of } xy = SS_{xy} = 934.49$$

$$b_1 = \frac{SS_{xy}}{SS_x} = \frac{934.49}{765.98} = 1.21$$

$b_1$  is a slope of parameter.



QUESTION : 03

$$\hat{y} = b_0 + b_1 x$$

$$b_0 : y\text{-intercept} = -3.72$$

$$b_1 : \text{slope} = 0.205$$

Relation b/w market share and product quality rating.

$$\begin{aligned} \hat{y} &= -3.72 + 0.205x \\ \hat{y} &= 0.205x - 3.72 \end{aligned}$$

QUESTION : 04

$r$  : coefficient of correlation : 0.289

$$b_0 : y\text{-intercept} = 16.119$$

$$b_1 : \text{slope} = 0.935$$

$$\hat{y} = b_1 x + b_0$$

$$\hat{y} = 0.935x + 16.119$$

Hence there is a positive linear relationship.



QUESTION 2 OS

$r$  : Coefficient of correlation : 0.981

$b_0$  : y-intercept = 177.64

$b_1$  : slope = 0.62

$$\therefore \hat{y} = b_1x + b_0$$

$$\boxed{\hat{y} = 0.62x + 177.64}$$

There is a positive linear relationship.

QUESTION 2 OB

$b_0$  : y-intercept = -8.762

$b_1$  : slope = 1.4211

(a)  $\therefore \hat{y} = b_1x + b_0$

$$\boxed{\hat{y} = 1.4211x + (-8.762)}$$



for S.S.E.

$x_i$	$\hat{y} = 1.421x - 8.762$	$y_i$	$(y_i - \hat{y})^2$
7.6	2.0582	2.3	0.0584
7.9	2.481	2.6	0.0132
8.3	3.054	2.9	0.0238
8.6	3.481	3.2	0.079
8.8	3.765	3.7	0.004
9	4.050	4.1	0.002
9.4	4.619	4.8	0.032
10.2	5.758	5.7	0.0033
11.4	7.465	7	0.216
12.1	8.465	8.9	0.192
			$\sum (y_i - \hat{y})^2 = 0.6258$

for S

$$S = \sqrt{\frac{\sum (y_i - \hat{y})^2}{n - 2}} = \sqrt{\frac{0.6258}{10 - 2}}$$

$$S = 0.279$$

for  $S_{xx}$

$$S_{xx} = \sum x^2 - \left[ \frac{(\sum x)^2}{n} \right] = 890.23 - \left[ \frac{(93.3)^2}{10} \right]$$

$$S_{xx} = 19.741$$



QUESTION : 07

$H_0$ : Not a linear relationship b/w  
length of negotiations and transactions  
profit or  $\rho = 0$ .

$H_a$ : a linear relationship or  $\rho \neq 0$

$$\alpha = 0.05 \Rightarrow \alpha/2 = 0.025$$

$$n = 27$$

$$df = 25 = n - 2$$

$$r = 0.424$$

$$\text{Critical value} = 0.38086$$

$$r > \text{C.V.}$$

$\therefore$  we reject the null hypothesis  
There is some relationship.