Lab no : 4 ***Date : 2081/ /***

Title: Correlation and Regression

PROJECT 4.1 (Simple Linear Regression):

Enter the following values in SPSS and find the regression equation of Y on X:

X	1	2	3	4	5	6	7
Y	6	7	5	4	3	1	2

WORKING EXPRESSION:

Regression Equation is given by:

$$Y = a + bX$$

where,

a = intercept

b = regression coefficient

y = dependent variable

x = independent variable

PROCEDURE:

1. Enter the values of variables X and Y
2. Select Analyze => Regression => Linear.
3. Move X into independent and Y into Dependent.
4. Click Continue => OK.

Calculation (From SPSS):

Coefficients [a]						
Model		***Unstandardized Coefficients***		***Standardized Coefficients***	***t***	***Sig.***
		B	***Std. Error***	***Beta***		
1	***Constant***	7.714	.742		10.392	.000
	X	-.929	.166	-.929	-5.594	.003

CONCLUSION:

The regression line is Y = 7.714 – 0.929X

PROJECT 4.2 (Simple Correlation):

Enter the following values in SPSS and find the correlation between X and Y:

X	1	2	3	4	5	6	7
Y	6	7	5	4	3	1	2

WORKING EXPRESSION:

Karl Pearson's Correlation Coefficient (r) = $\frac{n\Sigma xy - \Sigma x \Sigma y}{\sqrt{n\Sigma x^2 - (\sum x)^2}\sqrt{n\Sigma y^2 - (\sum y)^2}}$

Spearman's Rank Correlation Coefficient (R) = $1 - \frac{6\Sigma d^2}{n(n^2-1)}$

Kendall's Tau-b Correlation Coefficient (τB) = $\frac{n_c - n_d}{\sqrt{(n_0 - n_1)(n_0 - n_2)}}$

PROCEDURE:

1. Enter the values of variables X and Y
2. Select Analyze => Correlate => Bivariate.
3. Move X and Y into variables.
4. Select Pearson, Kendall's tau-b , Spearman.
5. Click Continue => OK.

Calculation (From SPSS):

Karl Pearson's Rank Correlation :

Correlations				
			X	***Y***
Karl Pearson's	***X***	***Correlation Coefficient***	1	-0.929**
		Sig. (2-tailed)		0.003
		N	7	7
	Y	***Correlation Coefficient***	-0.929**	1
		Sig. (2-tailed)	0.003	
		N	7	7
**. Correlation is significant at the 0.01 level (2-tailed).				

Spearman's Rank Correlation :

Correlations				
			X	***Y***
Spearman's	***X***	***Correlation Coefficient***	1.000	-0.929**
		Sig. (2-tailed)		0.003
		N	7	7
	Y	***Correlation Coefficient***	-0.929**	1.000
		Sig. (2-tailed)	0.003	
		N	7	7
*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).				

Kendall's Tau-b Correlation :

Correlations				
			X	***Y***
Kendall's Tau-b	***X***	***Correlation Coefficient***	1.000	-0.810**
		Sig. (2-tailed)		0.011
		N	7	7
	Y	***Correlation Coefficient***	-0.810**	1.000
		Sig. (2-tailed)	0.011	
		N	7	7
*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).				

<u>CONCLUSION:</u>

Karl Pearson's Correlation coefficient (r) = -0.929
Similarly, Spearman's Rank Correlation coefficient (R) = -0.929
Then, Using Kendall's Tau-b Correlation coefficient (τB) = -0.810

PROJECT 4.3 (Rank for Non-repeated Observations):

Calculate Spearman's Rank Correlation Coefficient from the following data.

Mark by A(X)	60	34	40	50	45	41	22	43	42	46	64	66
Mark by B(Y)	75	32	34	40	45	43	12	30	36	57	41	72

WORKING EXPRESSION:

Spearman's Rank Correlation Coefficient :

$$R = 1 - \frac{6[\Sigma d^2 + \frac{m_1(m_1^2-1)}{12} + \frac{m_2(m_2^2-1)}{12} + \cdots]}{n(n^2-1)}$$

PROCEDURE:

1. Enter the values of the variables X and Y.
2. Select Transform => Rank Cases.
3. Move X and Y into Variables.
4. Select Largest value.
5. Select Analyze => Correlate => Bivariate.
6. Move Rank of X and Rank of Y into Variables.
7. Select Spearman => Two-tailed => Flag significant correlations.
8. Click OK.

Calculation (From SPSS):

Correlations				
			Rank of Marks by_A	***Rank of Marks by_B***
Spearman's	***Rank of Mark_by_A***	***Correlation Coefficient***	1.000	0.748**
		Sig. (2-tailed)	.	0.005
		N	12	12
	Rank of Mark_by_B	***Correlation Coefficient***	0.748**	1.000
		Sig. (2-tailed)	0.005	.
		N	12	12
**. Correlation is significant at the 0.01 level (2-tailed).				

CONCLUSION:

The Spearman's Rank correlation coefficient is: r = 0.748