ECONOMICS

BOOKS - VK GLOBAL PUBLICATION

ECONOMICS (HINGLISH)

CORRELATION

Illustrations

1. **Linear Correlation**

[illegible]	4	6	8	10	12	14
[illegible]	10	15	20	25	30	35

Thus, for every change in variable (a) by 2 units

there is a change in variable (b) by 5 units.

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2. The following tables gives height nad weight of the students of a class. Make a scattered diagram to show if the relationship is positive or negative and if the relationship is strong or weak.

Height (cm)	180	150	158	165	175	163	195	155
Weight (kg)	65	54	55	65	60	54	63	50

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3. Calculate coefficient of correlation, given the following data :

X	2	3	4	5	6	7	8
Y	4	7	8	9	10	14	18

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4. Calculate coefficient of correlation, between the age of husbands and wives.

Age of Husband (Years)	21	22	28	32	35	36
Age of Wife (Years)	18	20	25	30	31	32

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5. Calculate coefficient of correlation between the price and quantity supplied.

Price (₹)	4	6	8	15	20
Supply (kg)	10	15	20	25	30

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6. Calculated coefficient of correlation between the price and quantity demanded.

Price (₹)	5	10	15	20	25
Demand (kg)	40	35	30	25	20

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7. In a fancy-dress competition, two judges accorded following ranks to the 10 participants :

Judge X	1	2	3	4	5	6	7	8	9	10
Judge Y	10	6	5	4	7	9	8	2	1	3

Calculate coefficient of rank correlation

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8. In a Poetry Recitation Competition , 10 participants were accorded following marks by two different judges, X and Y :

X	15	17	14	13	11	12	16	18	10	9
Y	15	12	4	6	7	9	3	10	2	5

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9. Calculate coefficient of rank correlation between the marks in Economics and Statistics, as indicated by answer books of each of the two examiners.

Marks in Statistics	15	10	20	28	12	10	16	18
Marks in Economics	16	14	10	12	11	15	18	12

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10. From the following data, compute the coefficient of correlation between X and Y series.

	X-Series	Y-Series
Number of Items	6	6
Arithmetic Mean	350	138
Squares of Deviations from Mean	19	94

Summation of product of deviations of X and Y series from their respective arithmetic mean =41

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11. From the following table, calculate the coefficient of correlation by Karl Pearson's method:

X	6	2	10	4	8
Y	9	11	–	8	7

Arithmetic means of X and Y series are 6 and 8 respectively.

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12. From the data given below, find the number of items (N), r=0.5, $\sum xy = 120$, Standard Deviation of $Y(\sigma_y) = 8$, $\sum x^2 = 90$ where , x and y are deviations from arithmetic mean.

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13. Find the coefficient of correlation from the following data:

X	10	12	18	16	15	19	18	17
Y	30	35	45	44	42	48	47	46

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14. If $r = 0.997, \sum xy = 46, \overline{X} = 4, \overline{Y} = 8, \sum x^2 = 28$, what will be the value of $\sum y^2$?

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15. Two ladies were asked to rank 10 different types of cell phone . The rank given by them are given below.

Cell Phone	A	B	C	D	E	F	G	H	I	J
Neelu	1	6	3	9	5	2	7	10	8	4
Neena	6	8	3	7	2	1	5	9	4	10

Calculate Spearman's rank correlation coefficient

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16. Calculate coefficient of correlation by means of ranking method from the following data :

X	40	50	60	60	80	50	70	60
Y	80	120	160	170	130	200	210	130

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17. Calculate the coefficient of correlation using Karl Pearson's formula of the series given below:

X	10	12	15	23	20
Y	14	17	23	25	21

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18. Calculate coefficient of correlation from the following data:

X	100	200	300	400	500	600
Y	110	120	135	140	160	165

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19. Calculate Karl Pearson's coefficient of correlation between the values of X and Y for the following data:

X	78	89	96	69	59	79	68	61
Y	125	137	156	112	107	136	123	108

Assume 69 and 112 as the mean values for X and Y respectively.

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20. From the following data, compute Karl Pearson coefficient of correlation :

	X-Series	Y-Series
Number of Items	7	7
Arithmetic Mean	4	8
Sum of Squares of Deviations from Arithmetic Mean	28	76

Summation of product of deviation of X and Y series from their respective means is 46

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21. If $r = 0.25, \sum xy = 45, \sigma_y = 3, \sum x^2 = 50,$ where x and y denote deviation from their respective means, find the number of items.

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22. The rank of 8 same students in tests in Mathematics and Statistics were as follows :

Rank in Mathematics	1	2	3	4	5	6	7	8
Rank in Statistics	4	2	1	6	8	3	5	7

Calculate the coefficient of rank correlation.

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23. Find out coefficient of rank correlation between X and Y

X	46	56	39	45	54	58	36	40
Y	30	60	40	50	70	70	30	50

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24. The rank correlation coefficient between marks obtained by 10 students in English and Statistics was found to be 0.5. Find the sum of squares of different of ranks.

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Learning By Doing

1. Explain the relation between price and quantity supplied through a scattered diagram

Price (₹)	10	20	30	40	50	60
Quantity Supplied	25	50	75	100	125	150

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2. Show the relationship between X and Y through a scattered diagram.

X	8	16	24	31	42	50
Y	70	58	50	32	26	12

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3. Find out coefficient of correlation between the age of Husband and Wife, using Karl Pearson's method base on actual mean value of the

following series:

Age of Husband	20	23	27	31	35	38	40	42
Age of Wife	18	20	24	30	32	34	36	38

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4. Calculate Karl Pearson's coefficient of correlation between the age and weight of children.

Age (Years)	1	2	3	4	5
Weight (kg)	3	4	6	7	10

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5. Caculate coefficient of rank correlation, given the following data set:

X	20	11	72	65	43	29	36
Y	60	63	26	35	43	51	37

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Objective Type Questions

1. When two variables change in the same direction, then such a collertion is called :

A. negative

B. positive

C. no correlation

D. all of above

Answer: B

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2. When the relation of three or more variables is studied simultaneously, it is called :

A. siple correlation

B. partial correlation

C. multiple correlation

D. none of above

Answer: C

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3. Relation between price and demand is :

A. positive

B. negative

C. one to one

D. no relationship

Answer: B

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4. When cofficient of correlation lies between +0.25 and +0.75 , it is called :

A. perfect degree of correlation

B. high degree of correlation

C. moderate degree of correlation

D. low degree of correlation

Answer: C

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5. Cofficient of correlation lies always between :

A. 0 and +1

B. -1 and 0

C. -1 and $+1$

D. none of these

Answer: C

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6. Rank colleration is a superior method of analysis in case of _____ distribution .

A. qualitative

B. quantitative

C. frequency

D. none of these

Answer: A

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7. Which of the following equations is correct ?

A. $r_k = 1 - \frac{6\sum D^2}{N}$

B. $r_k = 1 - \frac{6\sum D^2}{N^2 - N}$

C. $r_k = 1 - \frac{6\sum D^2}{N^3 - N}$

D. $r_k = 1 - \frac{6\sum D^2}{N^4 - N}$

Answer: C

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8. Formula of Karl pearson's cofficient of colleration is :

A. $\frac{N\sigma_x\sigma_y}{N^3 - N}$

B. $\frac{\sum xy}{N\sigma_x\sigma_y}$

C. $\frac{\sigma_x\sigma_y}{N^3 - N}$

D. $\frac{\sum xy}{\sigma_x\sigma_y}$

Answer: B

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9. Whien two variables change in a constant proportion, it is called :

A. linear correlation

B. non-linear correlation

C. partial correlation

D. none of these

Answer: A

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Choose Apporpiate Word And Fill In The Blank

1. Correlation is a statistical technique that measures _____ relationship between different variables. (quantitative/qualitative)

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2. If $r = 0$, two variables are _____. (correlated/uncorrelated)

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3. _____offers a graphic expression of the direction and degree of correlation. (scattered diagram /Rank correlation)

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4. In the step-deviation method of estimating standard deviation, deviations are taken from the _____ (actual average/assumed average)

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Concept Based Objective Questions

1. Define correlation .

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2. Define partial correlation .

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3. What is the line of best fit ?

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4. Name the principal methods of calculating cofficient of correlation .

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5. What is the difference between positive and negative correlation .

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6. What is the nature of correlation of two variables , when they move in the same direction ?

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7. Cofficient of correlation is between -1 and +1 . How would you express it arithmetically ?

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8. When is rank correlation method used ?

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Short Answer Type Questions

1. IMPORTANCE OR SIGNIFICANCE OF CORRELATION

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2. Describe the various degrees of correlation .

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3. What are the different methods of finding correlation ?

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4. Explain the various kinds of correlation .

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5. Explain the scattered diagram method of correlation.

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6. Describe Karl Pearson's method of calculating cofficient of correlation.

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7. State the properties of correlation cofficient.

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8. Describe Spearman's rank difference method.

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9. State the merits of rank correlation cofficient .

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10. What kind of relationship between X and Y is indicated , if the points of the scattered diagram tend to cluster about

(i) a straight line parallel to the X-axis

(ii) a straight line parallel to the Y-axis

(iii) a straight line sloping upward ,and

(iv) straight line sloping downward ?

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Long Answer Type Questions

1. Define correlation . Give its importance in statistics .

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2. What is maent by correlation ? Explain its various kinds.

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3. Discuss Karl Pearson's method of calculating cofficient of correlation. Give its merits and limitations .

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4. Discuss Spearman's method of calculating cofficient of correlation. Give its merits and limitations.

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5. Explain the concept of correlation .what is the basic difference between :(i) Linear and non- linear correlation, and (ii) positive and negative correlation .

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6. (i)How is Karl Pearson's cofficient of correlation difened ?

(ii) What are the limits of the correlation cofficient r ?

If r = +1 in one situation and r = -1 in the other, what kind of relationship exists between the variables X and Y ?

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7. (i) Define Spearman's rank correlation (r_k).

(ii) What are limits of r_k ?

(iii) If the values of X and Y have been ranked and

we complete correlation between ranks of X and Y , will this correlation be equal to the value of r_k ?

A.

B.

C.

D.

Answer:

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Essential Practicals

1. Make a scattered diagram of the given below. Does any relationship exist between the two ?

X	4	5	6	7	8	9	10	11	12	13	14	15
Y	78	72	66	60	54	48	42	36	30	24	18	12

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2. Calculate cofficient of correlation of the age of husband and wife using Karl Person's method.

Husband (Age)	25	27	28	29	30	31	33	35	36
Wife (Age)	18	20	22	27	29	27	29	28	29

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3. Calculate correlation of the following data using Karl Pearson's method:

Series A	112	114	108	124	145	150	119	125	147	150
Series B	200	190	214	187	170	170	210	190	180	181

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4. Using assumed average in Karl Pearson's formula , calculate cofficient of correlation , given the following data:

X	78	89	97	69	59	79	68	61
Y	125	137	156	112	107	106	123	138

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5. Find out Karl Pearson's cofficient of correlation :

Capital Units (in '000)	10	20	30	40	50	60	70	80	90	100
Profit Receipt	2	4	8	5	10	15	14	20	22	30

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6. Seven students of a class secured following marks in economics and history . Calculate cofficient of correlation with the help of these data:

Economics	66	90	89	55	58	44	42
History	58	76	65	58	53	49	56

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7. Find out rank difference of X and Y:

X	80	78	75	75	58	67	60	59
Y	12	13	14	14	14	16	15	17

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8. Calculate cofficient of correlation of the following data with rank difference and Karl Pearson's method:

Economics (Marks)	77	54	27	52	14	35	90	25	56	60
Hindi (Marks)	35	58	60	46	50	40	35	56	44	42

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9. Seven students of teaching Economics in two universities are shown below. Calculate rank difference correlation.

Teaching Methods	I	II	III	IV	V	VI	VII
Rank of 'A's Students	2	1	5	3	4	7	6
Rank of 'B's Students	1	3	2	4	7	5	6

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10. Give three xamples of perfect correlation. Find out rank difference cofficient of correlation with the help of the following data:

X	48	33	40	9	16	65	26	15	57
Y	13	13	22	6	14	20	9	6	15

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11. Calculate cofficient of correlation of the following data :

X	10	6	9	10	12	13	11	9
Y	9	4	6	9	11	13	8	4

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12. Deviation of two series X and Y are shown . Calculate coefficient of correlation .

X	[illegible]	4	−2	+20	−10	0	+3	0	− 15	−5
Y	[illegible]	12	− 7	+25	−10	− 3	0	+2	− 9	− 15

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13. In a baby competition, two judges accorded following ranks to 12 compititors . Find the coefficient of rank correlation.

Entry	A	B	C	D	E	F	G	H	I	J	K	L
Judge X	1	2	3	4	5	6	7	8	9	10	11	12
Judge Y	12	9	6	10	3	5	4	7	8	2	11	1

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14. In a Fancy - dress competition,two judges accorded the following ranks to eight participants :

Judge X	8	7	6	3	2	1	5	4
Judge Y	7	5	4	1	3	2	6	8

Calculate coefficient of rank correlation.

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15. In a beauty contest , three judges accorded following ranks to 10 participants:

Judge I	1	6	5	10	3	2	4	9	7	8
Judge II	3	5	8	4	7	10	2	1	6	9
Judge III	6	4	9	8	1	2	3	10	5	7

Find out by Spearman's Rank Difference Method which pair of judges has a common taste in respect of beauty.

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16. Following data relates to age group and percentage of regular players. Calculates Karl Pearson's coefficient of correlation .

Age Group	20–25	25–30	30–35	35–40	40–45	45–50
% of Regular Players	40	35	28	20	15	5

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17. From the following data, relating to playing habits in various age group of 900 students . Calculate cor=efficient of correlation between age group and playing habits:

Age Group	15–16	16–17	17–18	18–19	19–20	20–21
Number of Students	250	200	150	120	100	80
Regular Players	200	150	90	48	30	12

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18. Following data relates to density of population , number of deaths and population of various cities. Calculate death rate and Karl Pearson coefficient between density of population and death rate:

Cities	P	Q	R	S	T	U
Density of Population	200	500	700	500	600	900
Number of Deaths	840	300	312	560	1,440	1,224
Population	42,000	30,000	24,000	40,000	90,000	72,000

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19. From the following information, determine coefficient of correlation between X and Y series.

	X-Series	Y-Series
Number of Items	15	15
Mean	25	18
SD	3.01	3.03
Sum of Squares of deviation from Mean	136	138
Sum of product of deviations of X and Y from their respective Means	122	

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20. From the following data, determine Karl Pearson's coefficient of correlation between X and Y series for 15 pairs .

	X-Series	Y-Series
Mean	80	120
Sum of Squares of deviation from Arithmetic Mean	56	156
Sum of product of deviations of X and Y from their respective Means	92	

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Ncert Questions With Hints To Answers

1. Can r lies outside the -1 and 1 range depending on the type of data ?

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2. Does correlation imply causation ? ,No.

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3. When is rank correlation more precise than simple correlation cofficient ?

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4. Does zero correlation mean independence ?

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5. Can simple correlation cofficient measure any type of relationship ?

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6. Interpret the value of r as 1, -1 and 0.

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7. Why does rank correlation cofficient differ from Pearsonian correlation cofficient ?

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8. Calculate the correlation cofficient between the heights of Fathers in inches (X) and their sons (Y).

X	65	66	57	67	68	69	70	72
Y	67	56	65	68	72	72	69	71

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9. Calculate the correlation cofficient between X and Y and comment on their relationship.

X	-3	-2	-1	1	2	3
Y	9	4	1	1	4	9

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10. Calculate the correlation cofficient beteen X and Y and comment on their relationship .

x	1	3	4	5	7	8
y	2	6	8	10	14	16

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