MATHS

BOOKS - S CHAND MATHS (ENGLISH)

CORRELATION ANALYSIS

Example

1. Give $r = 5, \sum xy = 120, \sigma = 8$ and $\sum x^2 = 90,$ find the number of items ,(x and y are deviations from arithmetic average).

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2. The following table gives the test scores and sales by nine salesmen during last one year in a certain firm :

Test scores	14	19	24	21	26	22	15	20	19
Sales (in 000' ₹)	31	36	48	37	50	45	33	41	39

Compute the Karl Pearson's Coefficient of Correlation and interpret the result.

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3. Compute the correlation coefficient between the corresponding values of $\overrightarrow{X}$ and Y in the following table :

X	2	4	5	6	8	11
Y	18	12	10	8	7	5

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4. In order to find the correlation coefficient between two variables x and y from 12 pairs of observations , the following calculations were made : $\sum x = 30, \sum y = 5, \sum x^2 = 670, \sum y^2 = 285, \sum xy = 334.$ On subsequent verification it was found that the pair (x=11,y=4) was copied wrongly , the correct values being (x=10,y=14). Find the correct value of correlation coefficient .

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5. Calculate Kerl Pearson 's correlation coefficient between the marks in English and Hindi obtained by 10 students .

Marks in English	10	25	13	25	22	11	12	25	21	20
Marks in Hindi	12	22	16	15	18	18	17	23	24	17

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6. Given the following pairs of values of the variables X and Y :

X	2	4	6	8	10	12	14	16
Y	16	14	12	10	8	6	4	, 2

Find the Karl Pearson's coefficient of correlation , make a scatter diagram and interpret the result .

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7. Caculate the value of the correlation coeffcient for the following data :

(1,13), (2,23),(3,33),(4,43),(5,53),(6,63),(7,73),(8,83),(9,93),(10,103),(11,10.5),

(12,11),(13,11.5),(14,12),(15,12.5),(16,13),(17,13.5),(18,14),(19,14.5),(20,15).

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8. The coefficient of rank correlation of marks obtained by 10 students in English and Economics was found to be 0.5 . It was later discovered that the difference in ranks in the two subjects obtained by one of the students was wrongly taken as 3 instead of 7 . find the correct coefficient of rank correlation .

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9. Find out rank correlation from the following data :

S.No.	1	2	3	4	5	6	7	8	9	10
Rank differences	–2	–4	–1	+3	+2	0	–2	+3	+3	–2

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10. Find out the rank correlation coefficient berween the heights of fathers and sons from the following data :

Height of fathers in inches	65	66	67	67	68	69	70	72
Height of sons in inches	67	68	65	68	72	72	69	71

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Exercise A

1. A physicist is experimenting with the resistance in a ciruit she is using .

She measures and records the resulting current .

Resistance (ohms)	5	10	15	20	25	30	50
Current (amps)	10	4.9	3.2	2.4	1.9	1.7	1.0

Draw a scatter graph of her results .

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2. Calculate Karl Pearson 's coefficient of correlation between the values of X and Y for the following data .Comment on the values of r

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

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3. Calculate Karl Pearson 's coefficient of correlation between the values of X and Y for the following data .Comment on the values of r

X	1	2	3	4	5	6	7	8	9
Y	12	11	13	15	14	17	16	19	18

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4. Calculate Karl Pearson 's coefficient of correlation between the values of X and Y for the following data .Comment on the values of r

	X series	Y series
Number of pairs of observation	15	15
Arithmetic mean	25	18
Standard deviation	3.01	3.03
Sum of the squares of deviation from the mean	136	138
Sum of the product of the deviations of x and y series from their respective means	122	

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5. Caculate the Pearson 's coefficient of correlation between the ages of husband and wife

Age of husband	35	34	40	43	56	20	38
Age of wife	32	30	31	32	53	20	33

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6. Given $r = 0.8, \sum xy = 60, \sigma_y = 2.5$ and $\sum x^2 = 90,$ find the number of items . X and y are deviations from their respective mean .

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7. Calculate Karl Pearson 's coefficient of correlation between the values of x and y for the following data .

(1,2),(2,4),(3,8),(4,7),(5,10),(6,5),(7,14),(8,16),(9,2),(10,20)

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8. Calculate Karl Pearson 's coefficient of correlation between the values of x and y for the following data .

$n = 10, \sum x = 55, \sum y = 40, \sum x^2 = 385, \sum y^2 = 192$ and $\sum (x +$

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9.

X	16	18	21	20	22	26	27	15
Y	22	25	24	26	25	30	33	14

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10.

X	1	2	4	5	7	8	10
Y	2	6	8	10	14	16	20

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11. Calculate Karl Pearson 's corrlation coefficient between the marks in English and Hindi obtained by 10 students .

Marks in English	10	25	13	25	22	11	12	25	21	20
Marks in Hindi	12	22	16	15	18	18	17	23	24	17

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12. A computer expert while calculating correlation coefficient between X and Y from 25 pairs of observations obtained the following results :

$n = 25, \sum X = 125, \sum X^2 = 650, \sum = 100, \sum Y^2 = 460, \sum XY =$

It was , however , later discovered at the time of checking that he had

copied down two pais as $\begin{vmatrix} \frac{X}{6} & \frac{Y}{14} \\ 8 & 6 \end{vmatrix}$ while the correct values were $\begin{vmatrix} \frac{X}{8} & \frac{Y}{12} \\ 6 & 8 \end{vmatrix}$ Obtain the correct value of correlation coefficient .

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13. A computer obtained the $n = 30, \sum x = 120, \sum y = 90, \sum x^2 = 600, \sum v^2 = 250$ and $\sum xy =$ Later on , it was found that pairs $(x,), (y,): \begin{vmatrix} 8 & 12 \\ 10 & 7 \end{vmatrix}$ are wrong while the correct values are $(x,), (y,): \begin{vmatrix} 8 & 10 \\ 12 & 8 \end{vmatrix}$ .Find the correct values of $\rho(X, Y)$.

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Exercise B

1. The marks obtained by nine students in Physics and Mathematics are given below :

Physics	48	60	72	62	56	40	39	52	30
Mathematics	62	78	65	70	38	54	60	32	31

Calculate Spearman 's coefficient correlation and interpret the result .

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2. In a skating competition the judges geve the five competiors the following marks :

Competitors	*A*	*B*	*C*	*D*	*E*
Ist Judge	5.7	5.8	5.9	5.6	5.5
2nd Judge	5.6	5.7	6.0	5.5	5.8

Calculate a coefficient of rank correlation .

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Chapter Test

1. Find the coefficient of correlation from the following pairs of observations :

(1,3),(2,2),(3,5),(4,4),(5,6)

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2. Find the Karl Pearson 's coefficient of correlation between x and y for following data ,

x	16	18	21	20	22	26	27	15
y	22	25	24	26	25	30	33	14

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3. From the following data , calculate the Karl Pearson 's coefficient of correlation , it being given that $\overrightarrow{y} = 8$.

x	6	2	10	4	8
y	?	11	5	8	7

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4. Caculate Karl Pearson 's coefficient between the values of x and y if $\sum x = 18, \sum x^2 = 90, n = 10, \sum y = 25, \sum y^2 = 120, \sum xy = 65$.

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5. A psychologist selected a random sample of 22 students . He grouped them in 11 pairs so that the students in each pairs have nearly equal scores in an intelligence test . In each pair , one student was taught by method A and the other by method B and examined after the course . The marks obtained by them after the course are as follows :

Pairs	1	2	3	4	5	6	7	8	9	10	11
Method A	24	29	19	14	30	19	27	30	20	28.	11
Method B	37	35	16	26	23	27	19	20	16	11	,21

Calculate Spearman 's Rank correlation .

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6. In a contest the competitors were warded marks out of 20 by two judges . The scores of the 10 competitors are given below . Calculate spearman 's correlation .

Pairs	A	B	C	D	E	F	G	H	I	J
Judge A	2	11	11	18	6	5	8	16	13	15
Judge B	6	11	16	9	14	20	4	3	13	17

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