Chapter 8 – Measures of Correlation

Question1

Evaluate the coefficient of rank correlation of ten artisans of a facility that is ranked in terms of their capability by 2 separate judges:

Artisans Name	P	Q	R	S	T	U	V	W	X	Y
Position given Judge P	2	9	5	5	2	2	4	7	8	10
Position given Judge R	3	8	5	7	2	3	2	5	10	9

Answer:

Artisans Name	**Position given Judge RP**	**Position given Judge RR**	***D= RP−RR***	***D2***
P	2	3	1	1
Q	9	8	1	1
R	5	5	0	0
S	5	7	-2	4
T	2	2	0	0
U	2	3	-1	1
V	4	2	2	4
W	7	5	2	4
X	8	10	-2	4
Y	10	9	1	1
				ΣD2=20

N= 10

$rk = 1 - 6\Sigma D^2$

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$Or, rk = \frac{6X20}{1000-10}$

rk= 1 – 0.121

rk = 0.88

Hence, the coefficient of rank correlation is 0.88

Question 2

Evaluate the coefficient of rank correlation.

Maths Marks	50	60	65	70	75	40	80	85
Accountancy Marks	80	71	60	75	90	82	70	50

Answer:

Maths Marks	***Accountancy Marks***	***R1***	***R2***	***D= R1−R2***	***D2***
50	80	2	6	−4	16
60	71	3	4	−1	1
65	60	4	2	2	4
70	75	5	5	0	0
75	90	6	8	−2	4
40	82	1	7	−6	36
80	70	7	3	4	16
85	50	8	1	7	49
					ΣD2=126

N= 8

$rk = 1 - 6\Sigma D^2$

$\text{Or, } rk = \frac{6X126}{512-8}$

rk = 0.5

Hence, the coefficient of rank correlation is 0.5

Question 3

What is the coefficient of rank correlation of the following information

Subject A	3	5	8	4	7	10	2	1	6	9
Subject B	6	4	9	8	1	2	3	10	5	7

Answer:

RA	**RB**	**D = RA− RB**	**D2**
3	6	−3	9
5	4	1	1

8	9	−1	1
4	8	−4	16
7	1	6	36
10	2	8	64
2	3	−1	1
1	10	−9	81
6	5	1	1
9	7	2	4
			ΣD2=214

N= 10

$$rk = 1 - \frac{6\sum D^2}{N^3 - N}$$

$$Or, rk = \frac{6X214}{1000 - 10}$$

rk = 0.2969

Hence, the coefficient of rank correlation is -0.297

Question 4

Evaluate rank correlation between advertisement sales and cost according to the following information

Cost	78	36	98	25	75	82	90	62	65	39
Sales (in lakh)	84	51	91	60	68	62	86	58	53	47

Answer:

Advertising Cost (X)	**Sales (Y)**	**R1**	**R2**	**D= R1−R2**	**D2**
78	84	7	8	−1	1
36	51	2	2	0	0
98	91	10	10	0	0
25	60	1	5	−4	16
75	68	6	7	−1	1
82	62	8	6	2	4

90 62 65 39	86 58 53 47	9 4 5 3	9 4 3 1	0 0 2 2	0 0 4 4
					ΣD2=30

N= 10

$$rk = 1 - \frac{6\sum D^2}{N^3 - N}$$

$$Or, rk = 1 - \frac{6X3}{1000 - 10}$$

rk = 1 – 0.1818 = – 0.818

Hence, the coefficient of rank correlation is -0.82

Question 5

Evaluate rank coefficient of correlation.

X	1	2	3	4	5	6	7	8	9	10	11	12
Y	12	9	6	10	3	5	4	7	8	2	11	1

Answer:

X	***Y***	***R1***	***R2***	***D=R1−R2***	***D2***
1	12	1	12	−11	121
2	9	2	9	−7	49
3	6	3	6	−3	9
4	10	4	10	−6	36
5	3	5	3	2	4
6	5	6	5	1	1
7	4	7	4	3	9
8	7	8	7	1	1
9	8	9	8	1	1
10	2	10	2	8	64

11 12	11 1	11 12	11 1	0 11	0 121
N = 12					ΣD2=416

Here, m= 0

$$rk = 1 - \frac{6\sum D^2}{N^3 - N}$$

$$rk = 1 - \frac{6X416}{1728 - 12}$$

$$Or, rk = 1 - \frac{2946}{1716}$$

rk = – 0.454

Hence, the coefficient of rank correlation is – 0.454