CHANAKYA 2.0

For CA Foundation

Correlation

QUANTITATIVE APTITUDE

By Anurag Chauhan

TOPICS TO BE COVERED

01 Correlation

02 Karl Pearson Method

03 Spearman Method

04 Concurrent Deviation

Correlation

"**Statistical Technique** used to Measure The **Degree & Direction** of the relation between **two Variables**

$x \uparrow \; y \uparrow$

P	Q
10	10
11	10
12	10

$P \uparrow Q \downarrow$

P	Q
10	50
11	40
12	30

x	y
1	10
2	11
3	12
4	13
5	14

Positive Correlation v/s Negative Correlation

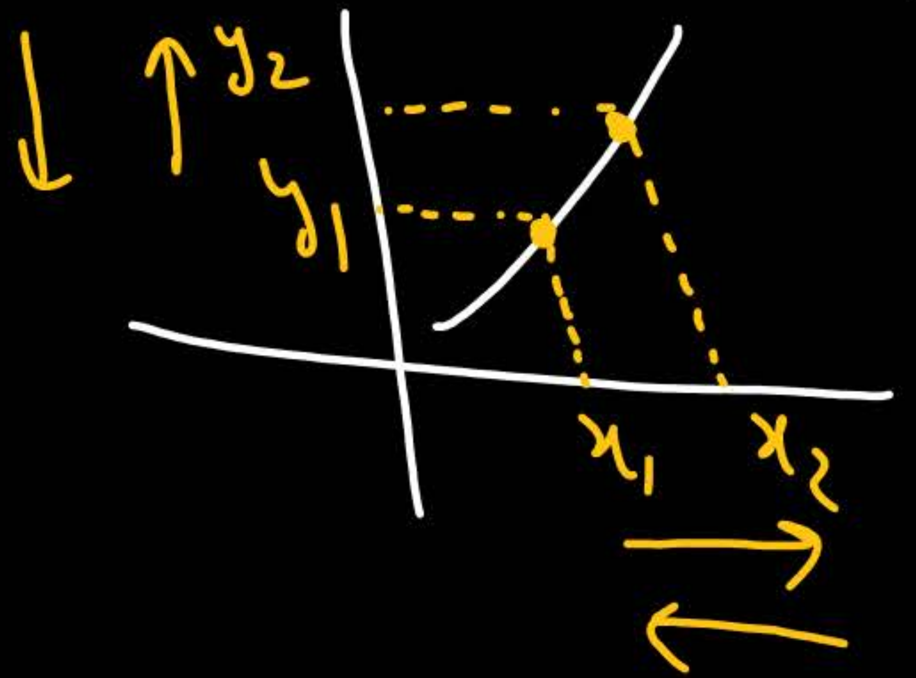
$\Downarrow$

Direction Relation b/w x & y

$\Downarrow$

$x \uparrow \quad y \uparrow$

$x \downarrow \quad y \downarrow$



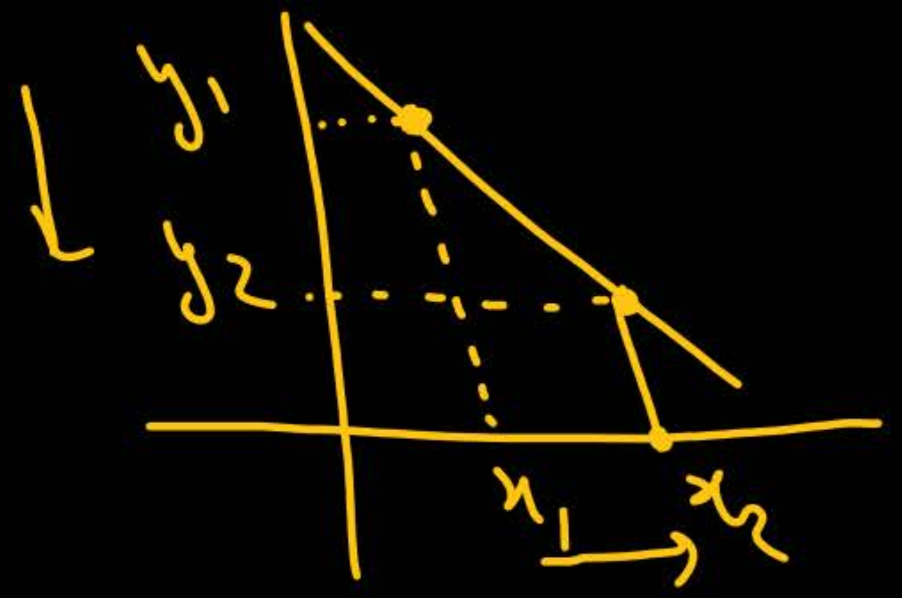
$\Downarrow$

Inverse Relation b/w x & y

$\Downarrow$

$x \uparrow \quad y \downarrow$

$x \downarrow \quad y \uparrow$



1) $\underbrace{\text{Age of Father}}_{}^{(x)}$ and $\underbrace{\text{Mother}}_{}^{(y)}$ $x\uparrow y\uparrow$ Positive.

2) Production Of Wheat and Rainfall $x\uparrow$ $y\uparrow$ Positive.

3) Price of Commodity and Its Demand $P\uparrow$ $D\downarrow$ Negative.

4) No of Competitors and Price Of Product

Inverse Relation.

Measures of Linear Correlation For A Bivariate Distribution...

#Graphical Method (Scattered Diagram method)

#Non Graphical

- **Karl Pearson's Coefficient Correlation**
- **Spearman's Rank Correlation**
- **Concurrent Deviations Method**

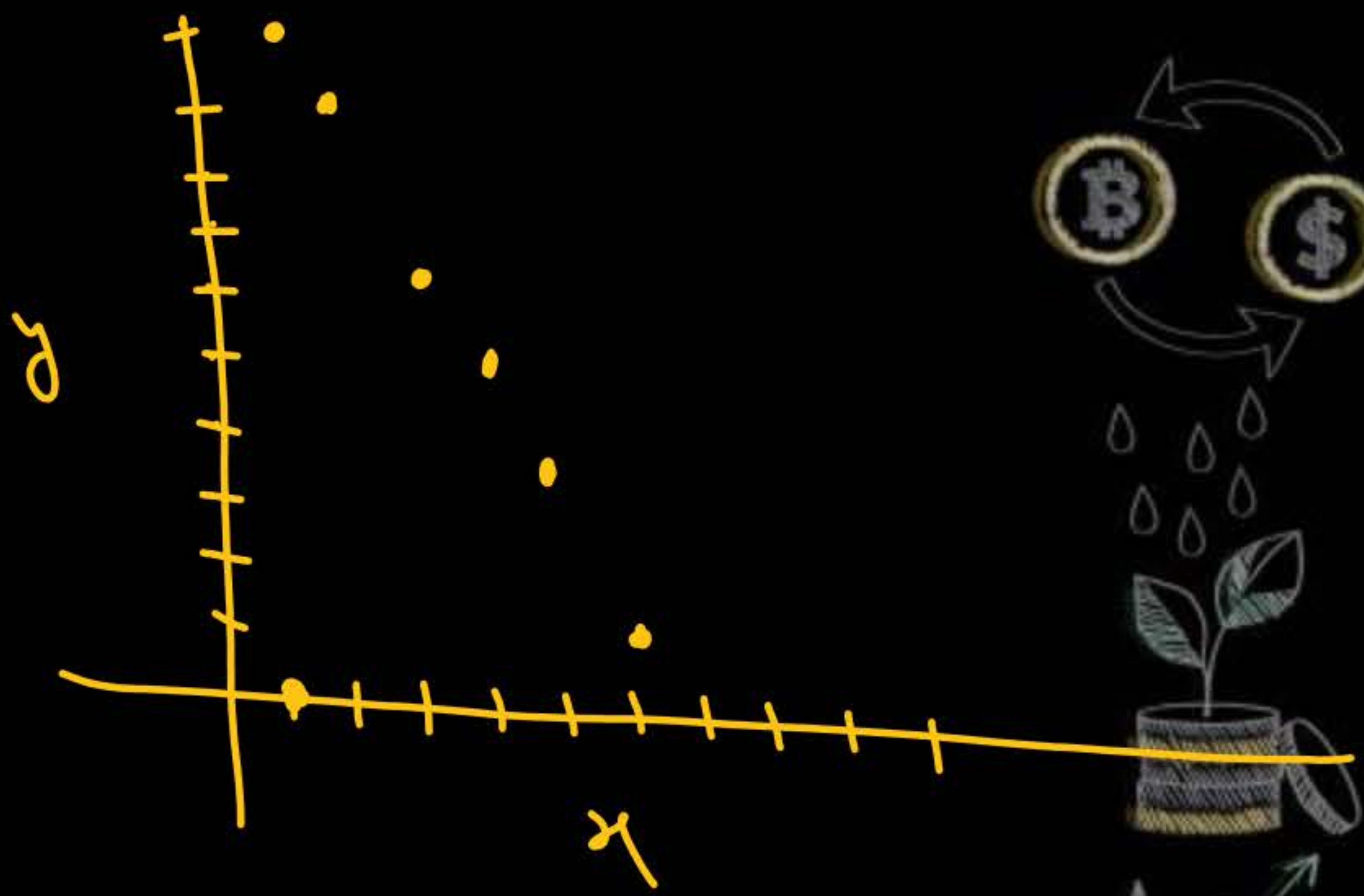
Graphical Method

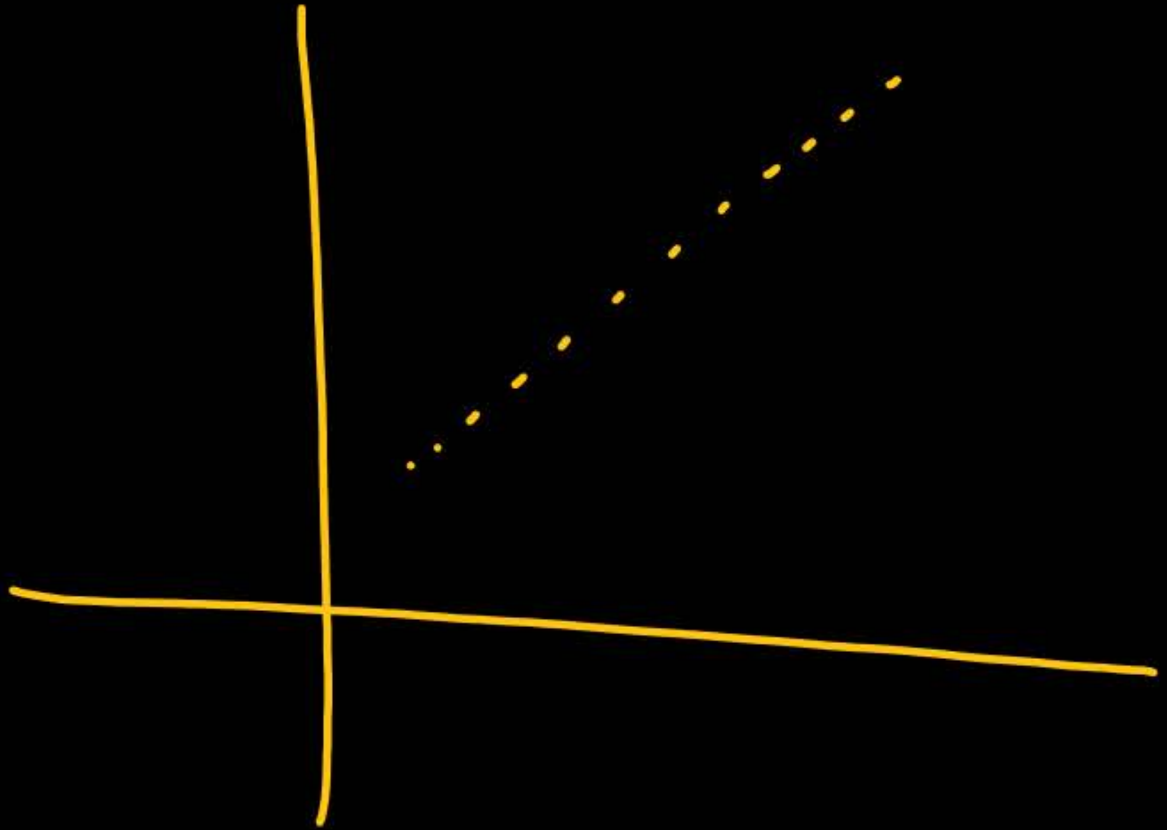
Scattered Diagram Method

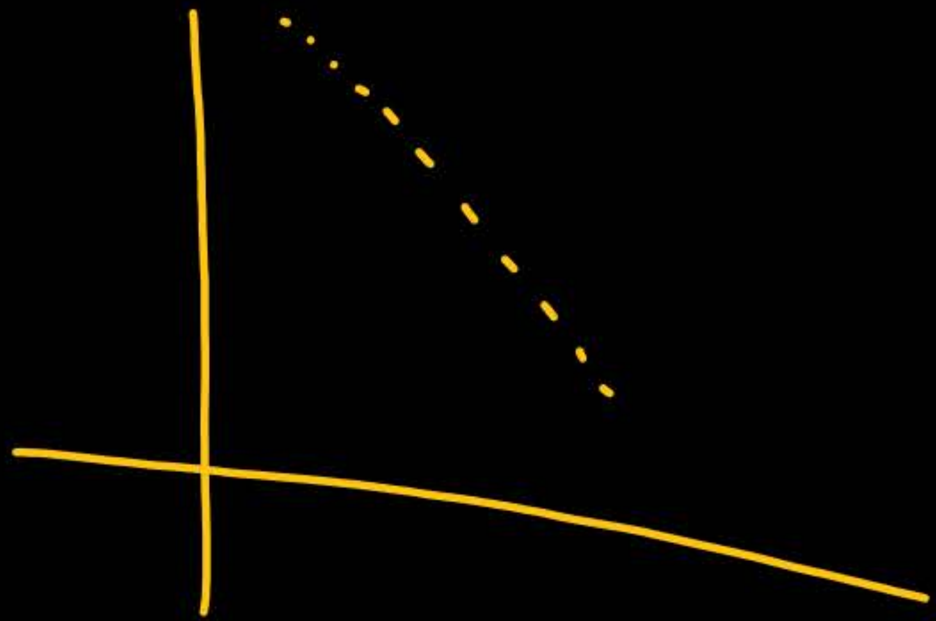
Points (x_i, y_i) are plotted. The totality of the points represents scatter diagram.

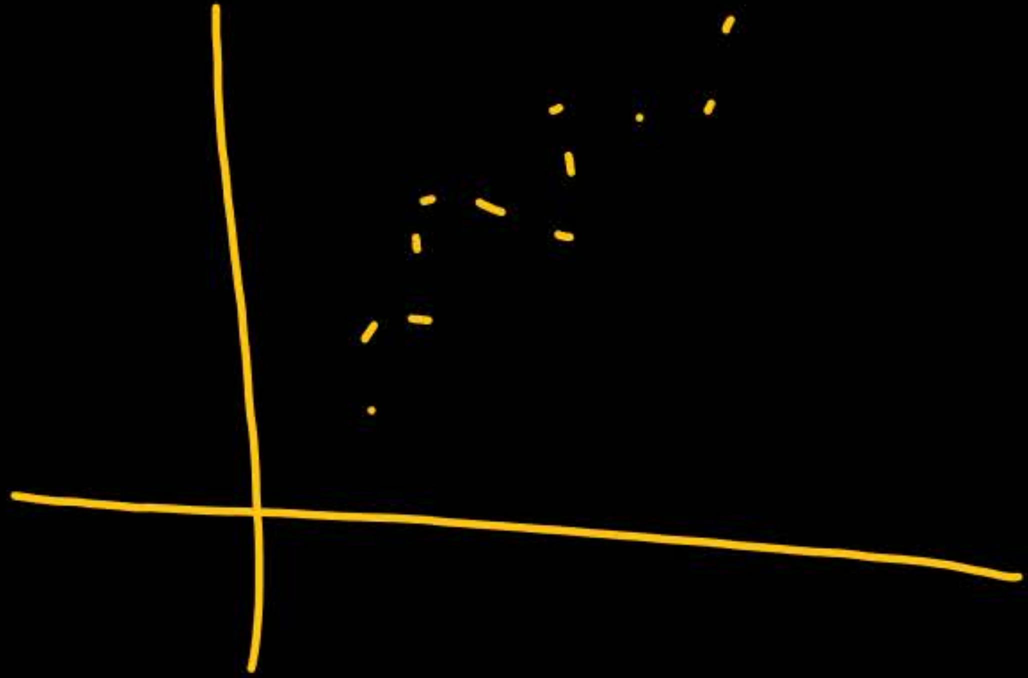
x_i	y_i
1	10
2	9
3	6
4	5
5	3
6	1

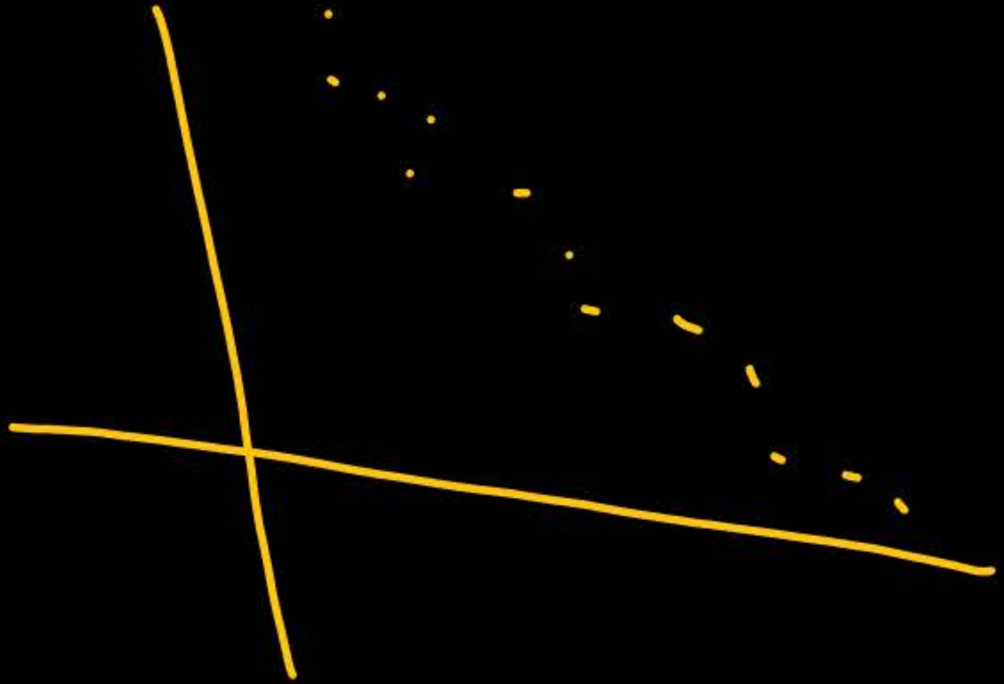
$(1, 10)$











If the points plotted are concentrated from lower left corner to upper right corner, it is positive correlation.

Perfectly Positive correlation

$\Downarrow$

$r = 1$

Positive correlation

$0 < r < 1$

x	y
1	1
2	2
3	3
4	4
5	5

Perfectly Positive correlation

$\boxed{r = 1}$

Eg

x	y
1	2
2	4
3	6
4	8
5	10
6	12
7	14

Perfectly Positive correlation

$\boxed{r = 1}$

Eg

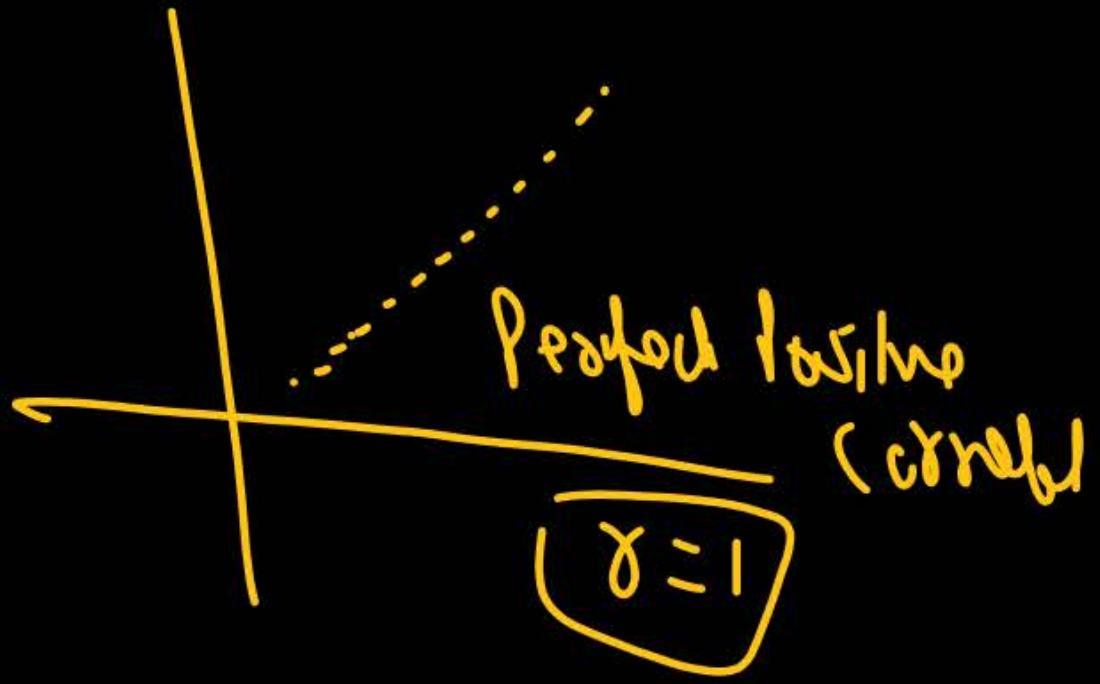
x	y
1	2
2	4
3	6
4	9
5	11
6	12
7	13
8	17
9	18
10	19

Positive Relation

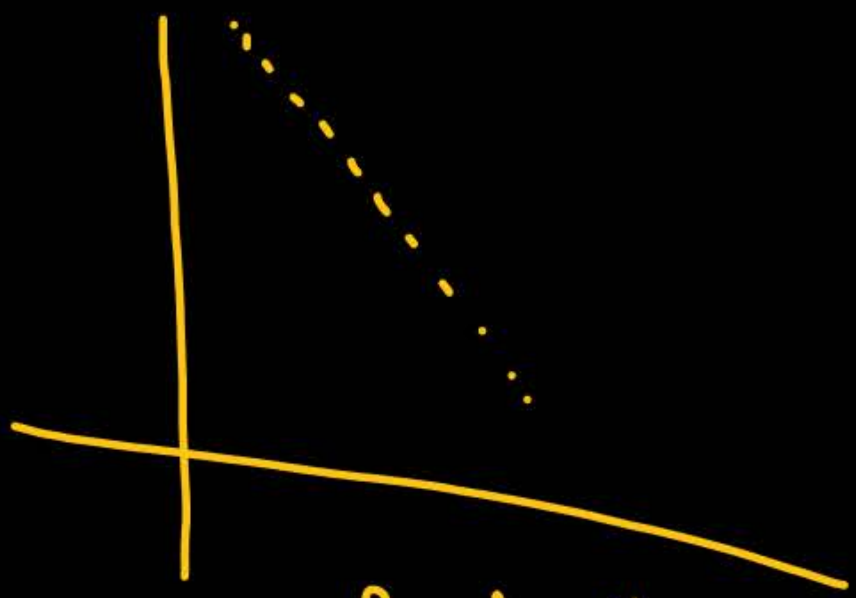
$0 < r < 1$


strong
positive
correlation


weak
positive
correlation

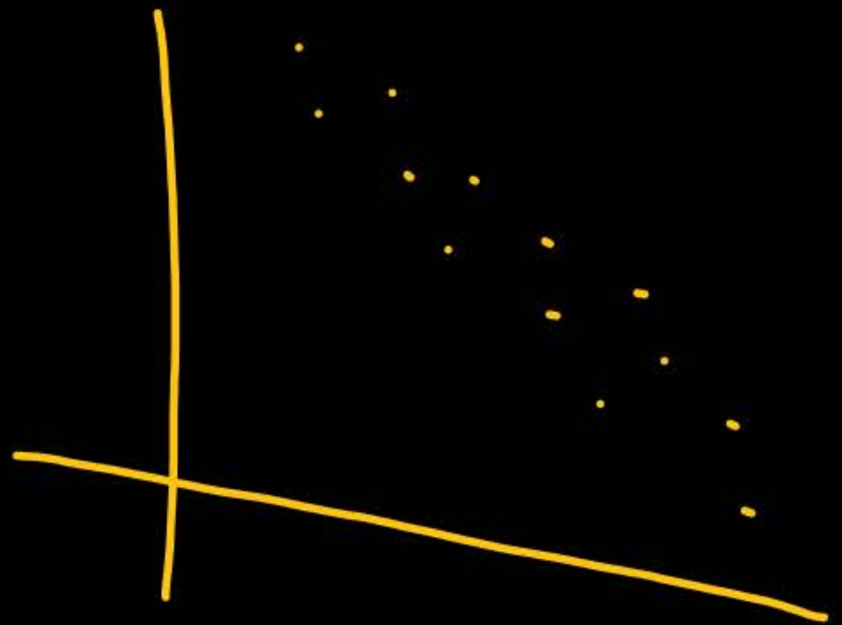

Perfect positive
correlation
$\boxed{r=1}$

If the points plotted are concentrated from upper left corner to lower right corner, it is negative correlation.



Perfectly negative correlation

$\boxed{r = -1}$



Negative correlation

$\boxed{-1 < r < 0}$

If the points are scattered without any pattern the variables are uncorrelated.

$$\text{correlation} = r = r(x, y)$$

$$\Downarrow$$

$$-1 \leq r \leq 1$$

-1 ⇓ $r = -1$ ⇓ Perfectly Negative

$-1 < r < 0$ ⇓ Negative correlation

0 ⇓ $r = 0$ ⇓ No correlation

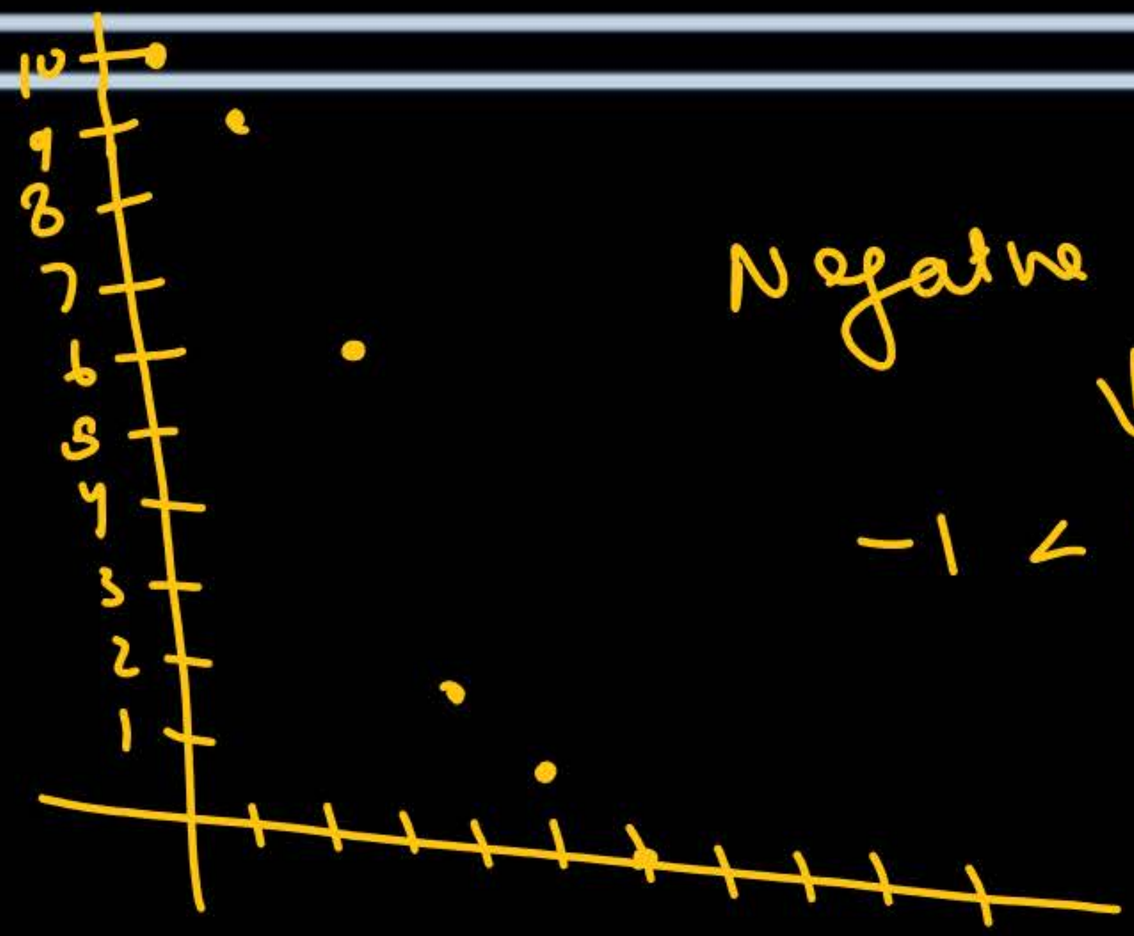
$0 < r < 1$ Positive correlation

1 ⇓ $r = 1$ ⇓ Perfectly Positive.

Find Correlation using graphically

X:	1	2	3	4	5	6
Y:	10	9	6	2	1	0

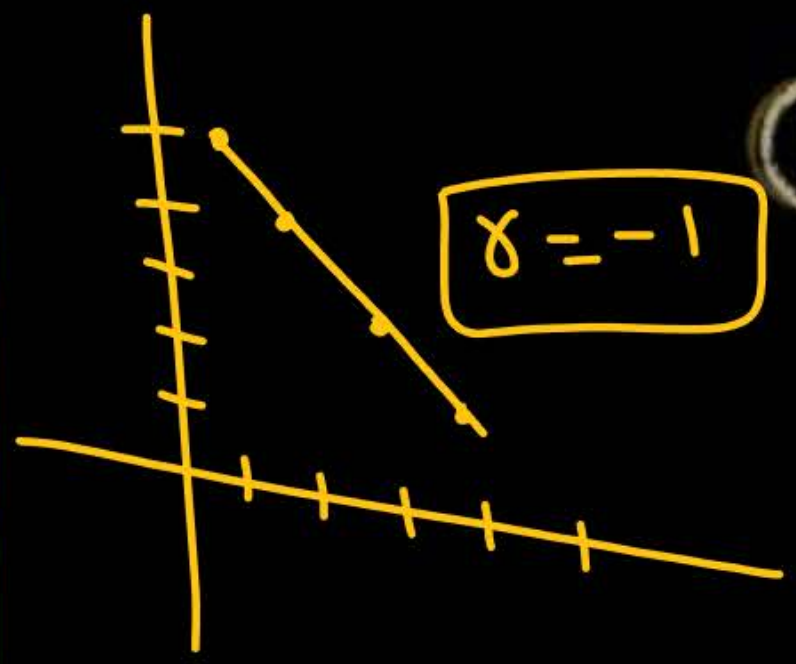
x	y
1	5
2	4
3	3
4	2



Negative correlation

$\Downarrow$

$-1 < r < 0$



$\boxed{r = -1}$

Karl Pearson's Method

Karl Pearson's Coefficient Of Correlation

covariance
$= cov(x, y)$

$$cov.(X, Y) = \frac{\Sigma (x_i - \bar{x}) \cdot (y_i - \bar{y})}{N}$$

\# $$\boxed{correlation\ (r) = \frac{cov.(x, y)}{\sigma_x \ \sigma_y}}$$

$r = \dfrac{\mathrm{cov}(x, y)}{\sigma_x \, \sigma_y}$

$\dfrac{\Sigma (x_i - \bar{x}) \cdot (y_i - \bar{y})}{N \, \sigma_x \, \sigma_y}$

$\dfrac{\Sigma (x_i - \bar{x}) \cdot (y_i - \bar{y})}{\sqrt{\Sigma (x_i - \bar{x})^2 \times \Sigma (y_i - \bar{y})^2}}$

$r = \dfrac{\Sigma xy - \dfrac{\Sigma x \times \Sigma y}{N}}{\sqrt{\Sigma x^2 - \dfrac{(\Sigma x)^2}{N}} \sqrt{\Sigma y^2 - \dfrac{(\Sigma y)^2}{N}}}$

$U = x_i - A$ & $V = y_i - a$

$r = \dfrac{\Sigma UV - \dfrac{\Sigma U \times \Sigma V}{N}}{\sqrt{\Sigma U^2 - \dfrac{(\Sigma U)^2}{N}} \sqrt{\Sigma V^2 - \dfrac{(\Sigma V)^2}{N}}}$

Eg

x_i	y_i	$(x_i-\bar{x})$	$(y_i-\bar{y})$	$(x_i-\bar{x})(y_i-\bar{y})$	$(x_i-\bar{x})^2$	$(y_i-\bar{y})^2$
1	2	-1	-2	2	1	4
2	4	0	0	0	0	0
3	6	1	2	2	1	4
6	12			4	2	8

$\bar{X} = \frac{\Sigma x_i}{N} = \frac{6}{3} = 2$

$\bar{Y} = \frac{\Sigma y_i}{N} = \frac{12}{3} = 4$

$cov.(x, y)$

$= \frac{\Sigma (x_i-\bar{x})\cdot(y_i-\bar{y})}{N}$

$= \frac{4}{3}$

$= 1.333$

cov.(x, y) can be any Real no.

change of origin ⇒ NO

change of scale ⇒ Yes

$$\sigma_x = \sqrt{\frac{\Sigma (x_i - \bar{x})^2}{N}}$$

$$= \sqrt{\frac{2}{3}}$$

$$\sigma_y = \sqrt{\frac{\Sigma (y_i - \bar{y})^2}{N}}$$

$$= \sqrt{\frac{8}{3}}$$

Now

correlation

$$r = \frac{\text{cov.}(x, y)}{\sigma_x \; \sigma_y}$$

$$r = \frac{\left(\frac{4}{3}\right)}{\sqrt{\frac{2}{3}}\;\sqrt{\frac{8}{3}}}$$

$$r = \frac{\left(\frac{4}{3}\right)}{\frac{4}{3}} = 1 \Rightarrow \boxed{r = 1}$$

Find Karl Pearson Correlation between x and y

x:	1	2	3	4	5
Y:	2	3	4	5	6

A. 1

B. 0.5

C. -1

D. None

x_i	y_i	$x_i-\bar{x}$	$y_i-\bar{y}$	$(x_i-\bar{x})^2$	$(y_i-\bar{y})^2$	$(x_i-\bar{x})\cdot(y_i-\bar{y})$
1	2	-2	-2	4	4	4
2	3	-1	-1	1	1	1
3	4	0	0	0	0	0
4	5	1	1	1	1	1
5	6	2	2	4	4	4
15	20			10	10	10

$\bar{X} = \frac{\Sigma x_i}{N} = \frac{15}{5} = 3$ & $\bar{y} = \frac{20}{5} = 4$

$$r = \frac{\Sigma (x_i - \bar{x}) \cdot (y_i - \bar{y})}{\sqrt{\Sigma (x_i - \bar{x})^2 \times \Sigma (y_i - \bar{y})^2}}$$

$$= \frac{10}{\sqrt{10 \times 10}}$$

$$= \frac{10}{10}$$

$$= 1$$

Find Karl Pearson Correlation between x and y

x:	1	2	3	4	5
Y:	2	3	4	5	6

A. 1

B. 0.5

C. -1

D. None

x_i	y_i	x^2	y^2	xy
1	2	1	4	2
2	3	4	9	6
3	4	9	16	12
4	5	16	25	20
5	6	25	36	30
15	20	55	90	70

Now

$$r = \frac{\Sigma xy - \frac{\Sigma x \times \Sigma y}{N}}{\sqrt{\Sigma x^2 - \frac{(\Sigma x)^2}{N}}\sqrt{\Sigma y^2 - \frac{(\Sigma y)^2}{N}}}$$

$$= \frac{70 - \frac{(15)(20)}{5}}{\sqrt{55 - \frac{(15)^2}{5}}\sqrt{90 - \frac{(20)^2}{5}}}$$

$$= \frac{10}{\sqrt{10}\sqrt{10}} = \frac{10}{10} = 1$$

Find Karl Pearson Correlation between x and y

x: 1.2 2.2 3.2

Y: 7.4 6.4 5.4

A. 1

B. 0.5

C. -1

D. None

change of origin

change of origin

x_i	y_i	$U_i = x_i - 0.2$	$V_i = y_i - 6.4$	U^2	V^2	UV
1.2	7.4	1	1	1	1	1
2.2	6.4	2	0	4	0	0
3.2	5.4	3	-1	9	1	-3
		6	0	14	2	-2

$$r = \frac{\Sigma UV - \frac{\Sigma U \times \Sigma V}{N}}{\sqrt{\Sigma U^2 - \frac{(\Sigma U)^2}{N}}\sqrt{\Sigma V^2 - \frac{(\Sigma V)^2}{N}}}$$

$$= \frac{-2 - \frac{6 \times 0}{3}}{\sqrt{14 - \frac{(6)^2}{3}}\sqrt{2 - \frac{(0)^2}{3}}}$$

$$= \frac{-2}{\sqrt{2}\sqrt{2}} = \frac{-2}{\sqrt{4}} = \frac{-2}{2} = -1$$

$$\boxed{r = -1}$$

Find Karl Pearson Correlation between x and y

x: 2 4 6 8

Y: 3 6 9 12

(A.) 1

(B.) 0.5

(C.) -1

(D.) None

x_i	y_i	$U_i = x/2$	$V_i = y_i/3$	U^2	V^2	UV
2	3	1	1	1	1	1
4	6	2	2	4	4	4
6	9	3	3	9	9	9
8	12	4	4	16	16	16
		10	10	30	30	30

$$r = \frac{30 - \frac{10 \times 10}{4}}{\sqrt{30 - \frac{(10)^2}{4}}\sqrt{30 - \frac{(10)^2}{4}}}$$

$$= \frac{5}{\sqrt{5}\sqrt{5}} = \frac{5}{5} = 1$$

Karl Pearson coefficient of correlation

If K is added or subtracted from each observation
⇓
change of origin
⇓
'r' will remain same

If all the observations are multiplied or divided by any positive number
⇓
change of scale
⇓
'r' will remain same

Eg $r(x,y) = 0.6$

If $x_i + 10 = U$

& $y_i - 6 = V$

$r(U,V) = ?$

Sol:

Change of origin

$r(U,V) = r(x,y)$

$r(U,V) = 0.6$

Eg $r(x,y) = 0.4$

If $2x_i = U$

& $\frac{y_i}{5} = V$

$r(U,V) = ?$

Sol:

Change of scale

$r(U,V) = r(x,y)$

$r(U,V) = 0.4$

Eg $\quad r(x,y) = 0.7$

$2x_i = u \;\&\; -5y_i = v$

$r(u,v) = ?$

Sol:

$r(u,v) = (-)(+)\, r(x,y)$

$= -0.7$

x	y
1	10
2	20
3	30

$r = 1$

$x\uparrow \; y\uparrow$

$(2x)$	$(-3y)$
2	-30
4	-60
6	-90

$x\uparrow \; y\downarrow$

$r = -1$

Q $\quad r(x, y) = 0.42$

$$U = -2x_i \quad \& \quad v_i = -5y_i$$

$$r(U, V) = ?$$

Sol:

$$r(U, V) = (-)(-)\, r(x, y)$$

$$= (-)(-)\; 0.42$$

$$= +0.42$$

Eg $\quad r(x,y) = 0.67$

$u + 3x = 5$ & $2v - 5y = 7$

find $r(u,v) = ?$

Sol:

$u + 3x = 5$

$u = 5 - 3x$

$u = -3x + 5$

$2v - 5y = 7$

$2v = 7 + 5y$

$v = \frac{7}{2} + \frac{5}{2}y$

$r(u,v) = (-)(+)\, r(x,y)$

$= (-)(+)\, 0.67$

$= -0.67$

The coefficient of correlation between two variables X and Y is 0.8 and their covariance is 20. If the variance of X series is 16, find the standard deviation of Y series.

A. 6.25

B. 6.11

C. 6.45

D. 6.82

$r(x, y) = 0.8$

$cov(x, y) = 20$

$\sigma_x^2 = 16 \Rightarrow \sigma_x = 4$

$\sigma_y = ?$

Note

$r = \frac{cov(x, y)}{\sigma_x \sigma_y}$

$0.8 = \frac{20}{4 \sigma_y}$

$3.2 \sigma_y = 20$

$\boxed{\sigma_y = 6.25}$

If the Covariance between x and y is 20

Variance of x is 16, Then what will be variance of Y

A. More Than 10

B. More Than 100

C. More Than 25

D. Less than 10

$cov(x,y) = 20$

$\sigma_x^2 = 16 \Rightarrow \sigma_x = 4$

$\sigma_y^2 = ?$

$r = \frac{cov(x,y)}{\sigma_x \sigma_y}$

$r = \frac{20}{4\sigma_y} = \frac{5}{\sigma_y}$

$-1 \le r \le 1$

Also $r^2 \le 1$

$\left(\frac{cov}{\sigma_x \sigma_y}\right)^2 \le 1$

$\left(\frac{20}{4\sigma_y}\right)^2 \le 1$

$\frac{25}{\sigma_y^2} \le 1$

$25 \le \sigma_y^2$

Calculate the coefficient of correlation between X and Y series from the following data:

		X series		Y series
No. of observations	$N =$	15	$N =$	15
Arithmetic mean	$\bar{x} =$	25	$\bar{y} =$	18
Standard deviation	$\sigma x =$	5	$\sigma y =$	5

$\sum(X - 25)(Y - 18) = 125]$

$\Sigma(x-\bar{x})\cdot(y-\bar{y}) = 125$

A. -0.25

B. 0.5

C. $\boxed{0.333}$

D. None

$$r = \frac{\Sigma(x-\bar{x})\cdot(y-\bar{y})}{N\,\sigma x\,\sigma y}$$

$$= \frac{125}{15 \times 5 \times 5}$$

$$= 0.33$$

Find the coefficient of correlation between X and Y for the following data:

$N=25$, $\sum X = 125$, $\sum Y = 100$, $\sum X^2 = 650$

$\sum Y^2 = 436$ & $\sum XY = 520$

A. -0.25

B. 0.5

C. 0.333

D. None

$$r = \frac{\Sigma xy - \frac{\Sigma x \times \Sigma y}{N}}{\sqrt{\Sigma x^2 - \frac{(\Sigma x)^2}{N}}\sqrt{\Sigma y^2 - \frac{(\Sigma y)^2}{N}}}$$

$$= \frac{520 - \frac{125 \times 100}{25}}{\sqrt{650 - \frac{(125)^2}{25}}\sqrt{436 - \frac{(100)^2}{25}}}$$

$$= \frac{20}{\sqrt{25}\sqrt{36}}$$

$$= \frac{20}{5 \times 6}$$

$$= \frac{4}{6} = \frac{2}{3} = 0.6666$$

Spearman Method

Spearman's Rank Correlation

-Used For Relation Between Qualitative Characters

-Level of agreement between two judges

$$r = 1 - \frac{6 \Sigma D^2}{N^3 - N}$$

$$D = R_1 - R_2$$

	X Judge-A (Rank-1)	Y Judge-B (Rank-2)	X^2	Y^2	XY
Rinku	2	3	4	9	6
Pinku	3	2	9	4	6
Chinki	1	1	1	1	1
Tinki	4	4	16	16	16
	10	10	30	30	29

$$r = \frac{\sum xy - \frac{\sum x \times \sum y}{N}}{\sqrt{\sum x^2 - \frac{(\sum x)^2}{N}}\sqrt{\sum y^2 - \frac{(\sum y)^2}{N}}}$$

$$= \frac{29 - \frac{10 \times 10}{4}}{\sqrt{30 - \frac{(10)^2}{4}}\sqrt{30 - \frac{(10)^2}{4}}}$$

$$= \frac{29 - 25}{\sqrt{5}\sqrt{5}} = \frac{4}{5} = 0.8$$

$$\boxed{r = 0.8}$$

Spearman

	R_1	R_2	$D = R_1 - R_2$	D^2
A	2	3	−1	1
B	3	2	1	1
C	1	1	0	0
D	4	4	0	0
				2

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

$$= 1 - \frac{6 \times 2}{4^3 - 4}$$

$$= 1 - \frac{12}{60} = 1 - 0.2 = 0.8$$

Eg

R_1	R_2	$D = R_1 - R_2$	D^2
5	5	0	0
2	3	−1	1
3	1	2	4
1	2	−1	1
4	4	0	0
			$\boxed{6}$

Spearman Rank correlation?

now

$$r = 1 - \frac{6 \Sigma D^2}{N^3 - N}$$

$$= 1 - \frac{6 \times 6}{5^3 - 5}$$

$$= 1 - \frac{36}{120}$$

$$= 1 - 0.3$$

$$= 0.7$$

Find Spearman Correlation between x and y

x:	190	185	168	175	182	180	195	170
Y:	17	16	12	13	14	15	18	11

A. -0.95

B. 0.95

C. 0.50

D. None

x_i	y_i	R_1	R_2	D	D^2
190	17	2	2	0	0
185	16	3	3	0	0
168	12	8	7	1	1
175	13	6	6	0	0
182	14	4	5	-1	1
180	15	5	4	1	1
195	18	1	1	0	0
170	11	7	8	-1	1
					4

Now

$$r = 1 - \frac{6\Sigma D^2}{N^3 - N}$$

$$= 1 - \frac{6 \times 4}{8^3 - 8}$$

$$= 1 - \frac{24}{504}$$

$$= 1 - 0.0476$$

$$= 0.952$$

Eg

x_i	y_i	R_1	R_2	D	D^2
10	25	3	2	1	1
15	30	2	1	1	1
8	5	4	4	0	0
25	2	1	5	-4	16
6	8	5	3	2	4
				0	22

Now

$$r = 1 - \frac{6\Sigma D^2}{N^3 - N}$$

$$= 1 - \frac{6 \times 22}{5^3 - 5} = 1 - \frac{132}{120} = 1 - 1.1 = -0.1$$

Find Spearman Correlation between x and y

x: 10 12 15 10 8

Y: 2 8 10 15 6

A. -0.95

B. 0.88

C. 0.91

D. None

x_i	y_i	R_1	R_2	D	D^2
10	2	2.5	5	-2.5	6.25
12	8	4	3	1	1
15	10	1	2	-1	1
10	15	2.5	1	1.5	2.25
8	6	5	4	1	1
					11.5

$\frac{2+3}{2} = 2.5$

'10' repeats 2 times $\Rightarrow m_1 = 2$

Now

$$\gamma = 1 - \frac{6\left[\Sigma D^2 + \frac{1}{12}(m_1^3 - m_1)\right]}{N^3 - N}$$

$$= 1 - \frac{6\left[11.5 + \frac{1}{12}(2^3 - 2)\right]}{5^3 - 5}$$

$$= 1 - \frac{6\left[11.5 + 0.5\right]}{120}$$

$$= 1 - 0.6$$

$$\gamma = 0.4$$

If some elements repeat

$$\gamma = 1 - \frac{6\left[\Sigma D^2 + \frac{1}{12}(m_1^3 - m_1) + \frac{1}{12}(m_2^3 - m_2) + \frac{1}{12}(m_3^3 - m_3)\right]}{N^3 - N}$$

$\left.\begin{matrix} m_1 \\ m_2 \\ m_3 \end{matrix}\right\} \Rightarrow$ frequency of repeating number

Find Spearman Correlation between x and y

x:	2	5	7	5	6	5
Y:	10	6	7	6	2	1

A. -0.95

B. 0.48

C. -0.95

D. None

x_i	y_i	R_1	R_2	D	D^2
2	10	6	1	5	25
5	$\boxed{6}$	4	3.5	0.5	0.25
7	7	1	2	−1	1
5	$\boxed{6}$	4	3.5	0.5	0.25
6	2	2	5	−3	9
5	1	4	6	−2	4
					39.50

$m_1 = 3$

$m_2 = 2$

$\frac{3+4+5}{3} = 4$

$\frac{3+4}{2} = 3.5$

$$r = 1 - \frac{6\left[\Sigma D^2 + \frac{1}{12}(m_1^3 - m_1) + \frac{1}{12}(m_2^3 - m_2)\right]}{N^3 - N}$$

$$= 1 - \frac{6\left[39.50 + \frac{1}{12}(3^3 - 3) + \frac{1}{12}(2^3 - 2)\right]}{6^3 - 6}$$

$$= 1 - \frac{6\left[39.50 + 2 + 0.5\right]}{210}$$

$$= 1 - 1.2$$

$$= -0.2$$

If the sum of squares of the rank differences of 10 pairs of values is 30, find the correlation coefficient between them.

A. 0.81

B. 0.75

C. -0.95

D. None

$$\Sigma D^2 = 30$$

$$N = 10$$

$$r = 1 - \frac{6 \Sigma D^2}{N^3 - N}$$

$$= 1 - \frac{6 \times 30}{10^3 - 10}$$

$$= 1 - 0.1818 = 0.8181$$

The coefficient of rank correlation of the marks obtained by 10 students in statistics and accountancy was found to be 0.8. it was later discovered that the difference in ranks in the two subjects obtained by one of the students was wrongly taken as 7 instead of 9. Find the correct value of coefficient of rank correlation

A. 0.606

B. 0.505

C. 0.707

D. 0.404

$N = 10$

$r = 0.8$

$r = 1 - \frac{6 \Sigma D^2}{N^3 - N}$

$0.8 = 1 - \frac{6 \Sigma D^2}{10^3 - 10}$

D	D^2
× 7	49 ×
✓ 9	81 ✓
	? = 33

$-0.2 = \frac{-6 \Sigma D^2}{990}$

wrong $\Sigma D^2 = 33$

Correct $\Sigma D^2 = 33 - 49 + 81$

$= 65$

$$r = 1 - \frac{6\,\Sigma D^2}{N^3 - N}$$

$$= 1 - \frac{6 \times 65}{10^3 - 10}$$

$$= 1 - 0.3939$$

$$= 0.6060$$

Concurrent Deviation Method

dx	x_i	y_i	dy
	2	8	
+	6	15	+
+	10	12	−
+	16	6	−
+	17	11	+

$$r = \pm\sqrt{\pm\left(\frac{2c-n}{n}\right)}$$

C = Total concurrent Deviation

n = Total no of pairs − 1

Find Correlations Using Concurrent deviations

x:	2	5	7	5	6	10	12	15
Y:	10	6	7	6	5	4	4	2

A. -0.95

B. -0.65

C. -0.25

D. None

x_i	y_i	Dx	Dy	Dx × Dy
2	10			
5	6	+	−	−
7	7	+	+	+
5	6	−	−	+
6	5	+	−	−
10	4	+	−	−
12	4	+	0	0
15	2	+	−	−

Total (+) Sign = C = 2

$C = 2$

$n = 7$

$$r = \sqrt{\frac{2C-n}{n}}$$

$$= \sqrt{\frac{2(2)-7}{7}}$$

$$= \sqrt{\frac{-3}{7}}$$

$$= -\sqrt{\frac{3}{7}}$$

$$= -0.65$$

eg

	x	y		
	10	6		
+	12	15	+	✓
+	18	14	−	×
−	14	13	−	✓
+	20	10	−	×

Total concurrent Deviation = 2 (c)

$c = 2$

$n = 4$

$$r = \sqrt{\frac{2c-n}{n}}$$

$$= \sqrt{\frac{2(2)-4}{4}}$$

$$r = 0$$

Eg

$$c = 6$$

$$n = 7$$

$$r = \sqrt{\frac{2c-n}{n}}$$

$$= \sqrt{\frac{2(6)-7}{7}}$$

$$= \sqrt{\frac{5}{7}}$$

$$= 0.8451$$

Eg

$$c = 4$$

$$n = 10$$

$$r = ?$$

Sol: $r = \sqrt{\frac{2c-n}{n}}$

$$= \sqrt{\frac{2(4)-10}{10}}$$

$$= \sqrt{\frac{-2}{10}}$$

$$= -\sqrt{\frac{2}{10}}$$

$$= -0.44$$

Coefficient Of Determinations

The coefficient of determination is used to explain the relationship between an independent and dependent variable.

It measures the amount of change in Dependent Variable due to Change in Independent variable

Coff. of Determination $= r^2 = \frac{\text{Explaind variance}}{\text{Total variance}}$

Coff of Non Determination $= 1 - r^2$

Eg $\quad r = 0.9$

Coeff of Determination

$$= r^2$$
$$= (0.9)^2$$
$$= 0.81$$

or

81%

Ind

$x \mid y$

Coeff of non Determination

$$= 1 - r^2 = 1 - 0.81 = 0.19 \text{ or } 19\%$$


Savings
FINANCE
THANK
YOU
KEEP REVISING
&
STAY MOTIVATED !!