

## 2. Negative Correlation

Correlation is said to be negative when the values of two variables move in the opposite direction.

Eg: Price and Demand.

(i.e) Correlation values lie between -1 to 0)

## 3. No Correlation

If the points lie scatter all over the diagram, there is no correlation between the two variables.

i.e Correlation value  $r = 0$

### Note:

1) Correlation value always lies between -1 to +1.

2) If  $r = +1$ , then correlation is said to be perfectly positive.

3) If  $r = -1$ , then the correlation is said to be perfectly negative.

4) If  $r = 0$ , then the correlation is said to be no correlation, or no relationship between variables.

# Karl Pearson's Coefficient of Correlation

Karl Pearson formulated the case of the greatest formula define the degree and extend of formulation between two or more variable. It is denoted by  $r$ .

$$\text{Coefficient of Correlation } = r = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}$$

Where  $x = x - \bar{x}$   
 $y = y - \bar{y}$

Calculate: Karl Pearson coefficient of Correlation between the age and weight of the children.

Age (Year)	1	2	3	4	5
Weight (kg)	3	4	6	7	12

Soln:

We know that Coefficient of

Correlation  $r = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}$

Where,  $x = x - \bar{x}$

$$y = y - \bar{y}$$

Here  $N = 5$

Mean  $\bar{x} = \frac{\sum x}{N} = \frac{15}{5}$

$$\bar{y} = \frac{\sum y}{N} = \frac{32}{5} = 6.4$$

X Age	$-(x - \bar{x})$ $x - 3$	$x^2$	Y Weight	$Y - (\bar{y})$ $(Y - 6.4)$	$Y^2$	$XY$
1	-2	4	3	-3.4	11.56	6.8
2	-1	1	4	-2.4	5.76	2.4
3	0	0	6	-0.4	0.16	0
4	1	1	7	+0.6	0.36	0.6
5	2	4	12	+5.6	31.36	11.2
$\sum X = 15$		$\sum x^2 = 10$	$\sum Y = 32$		$\sum y^2 = 49.2$	$\sum xy = 21$

Coefficient of Correlation =  $\frac{\sum xy}{\sqrt{\sum x^2} \sqrt{\sum y^2}}$

$$r = \frac{\sum xy}{\sqrt{\sum x^2} \sqrt{\sum y^2}}$$

$$= \frac{21}{\sqrt{10} \sqrt{49.2}}$$

$$= \frac{21}{22.1516}$$

$$= 0.948$$

$$r = 0.948 \text{ (positive correlation)}$$

∴ Age and weight of the children more in the same direction.

∴ The (Coefficient) of Correlation is positive correlation.