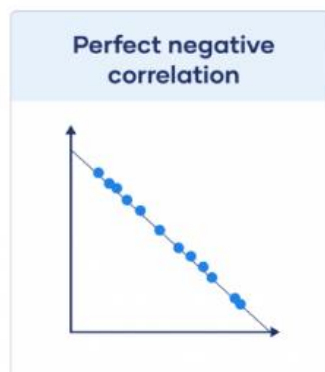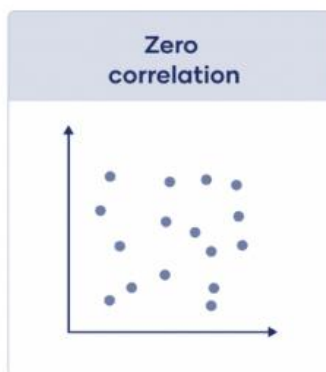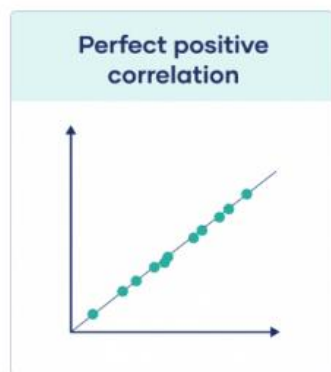# Correlation Coefficient

A **correlation coefficient** is a number between -1 and 1 that tells you the strength and direction of a relationship between variables.

هو مقياس احصائي لقياس مدى قوة العلاقة بين متغيرين، ويتم التعبير عنه كقيمة بين +1 و -1، بحيث يشير الرقم 1 إلى وجود ارتباط إيجابي (Positive correlation) قوية بين المُتغيرين، وذلك يعني أن حدوث أي تغير إيجابي في أحد المُتغيرات، سيتبعه تغير إيجابي في المُتغير الآخر.

Correlation coefficient value	Correlation type	Meaning
1	Perfect positive correlation	When one variable changes, the other variables change in the same direction.
0	Zero correlation	There is no relationship between the variables.
-1	Perfect negative correlation	When one variable changes, the other variables change in the opposite direction.

Perfect positive correlation

Zero correlation

Perfect negative correlation

$$r = \frac{S_{xy}}{S_x S_y}$$ where $$S_{xy} = \frac{\sum x_i y_i - \frac{(\sum x_i)(\sum y_i)}{n}}{n-1}$$

s_x = standard deviation of the x's

s_y = standard deviation of the y's

Correlation coefficient	Correlation strength	Correlation type
-.7 to -1	Very strong	Negative
-.5 to -.7	Strong	Negative
-.3 to -.5	Moderate	Negative
0 to -.3	Weak	Negative
0	None	Zero
0 to .3	Weak	Positive
.3 to .5	Moderate	Positive
.5 to .7	Strong	Positive
.7 to 1	Very strong	Positive

Question 1: Calculate coefficient of correlation between x and y for the following data:

x	1	2	3	4	5
y	2	4	6	8	10

Question 2: Find the coefficient of correlation for the following ages of husband and wife:

Husband's age	23	27	28	29	30	31
Wife's age	18	22	23	24	25	26