

MATH221, Week 7

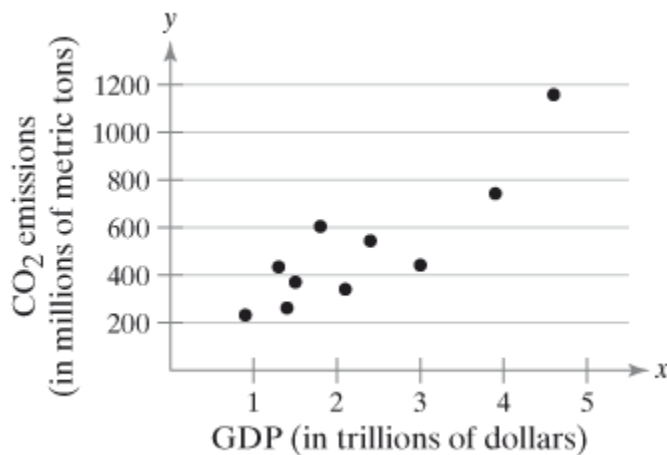
Correlations, Linear, non-linear, positive and negative

Introduction

A correlation is a relationship between two variables. The data can be represented by the ordered pairs (x, y) , where x is the **independent** (or **explanatory**) variable and y is the **dependent** (or **response**) variable. The independent variable x can be used to explain (or estimate) the value of the dependent variable y .

Linear Correlation

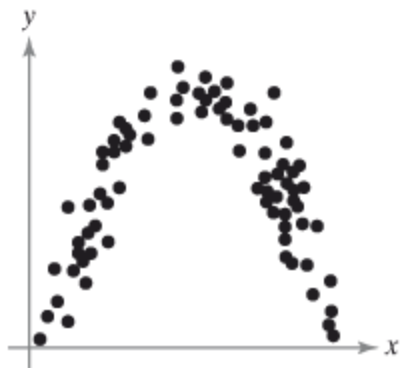
A linear correlation is one in which the pattern of the scatter plot of the ordered pairs (x, y) looks approximately like a line.



The relationship between GDP (independent variable) and CO₂ emissions (dependent variable) is linear as the pattern of dots approximates a line.

Non-linear Correlation

A non-linear correlation is when a relationship exists between the independent variable x and the dependent variable y and it is other than linear such as parabolic.

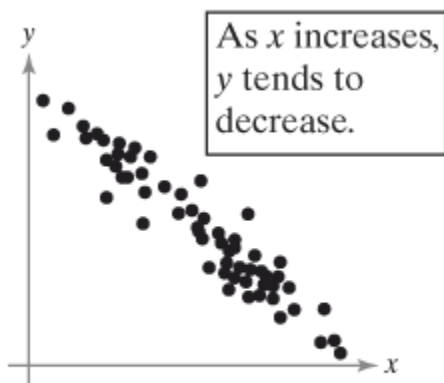


Nonlinear Correlation

The dots in this scatter plot form a clear pattern that looks like a parabola. Thus, there is a correlation between the x and y variables, but it is non-linear as the pattern does not approximate a line. This correlation would be parabolic or quadratic.

Negative Linear Correlation

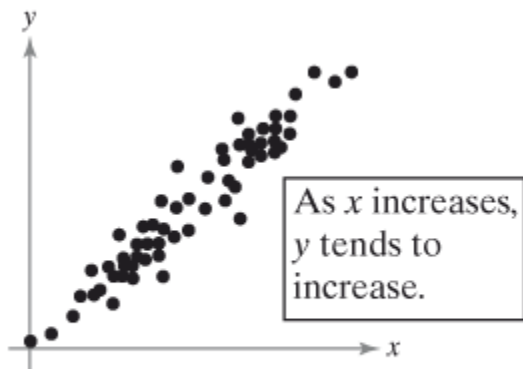
A negative linear correlation occurs when the values of the dependent variable y decrease as the values of independent variable x increase. The pattern of dots in the scatter plot will head downhill as one goes from left to right.



Negative Linear Correlation

Positive Linear Correlation

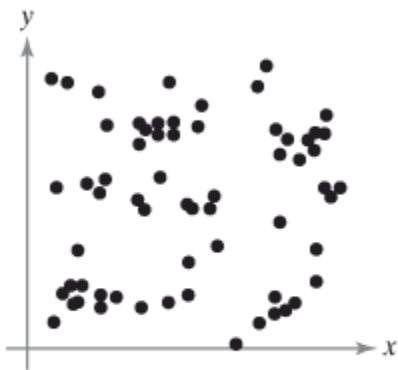
A positive linear correlation occurs when the values of the dependent variable y increase as the values of the independent variable x increase. The pattern of dots in the scatter plot will head uphill as one goes from left to right.



Positive Linear Correlation

No Correlation

When there is no discernable pattern in the scatter plot, there is no correlation between the independent variable x and the dependent variable y .



No Correlation