Values of the Pearson Correlation

Prerequisites
Introduction to Bivariate Data

The Pearson product-moment correlation coefficient is a measure of the strength of the *linear relationship* between two variables. It is referred to as Pearson's correlation or simply as the correlation coefficient. If the relationship between the variables is not linear, then the correlation coefficient does not adequately represent the strength of the relationship between the variables.

The symbol for Pearson's correlation is "ρ" when it is measured in the *population* and "r" when it is measured in a sample. Because we will be dealing almost exclusively with samples, we will use r to to represent Pearson's correlation unless otherwise noted.

Pearson's r can range from -1 to 1. An r of -1 indicates a perfect negative linear relationship between variables, an r of 0 indicates no linear relationship between variables, and an r of 1 indicates a perfect positive relationship between variables. Figure 1 shows a scatter plot for which r = 1.

Figure 1. A perfect linear relationship, r = 1.

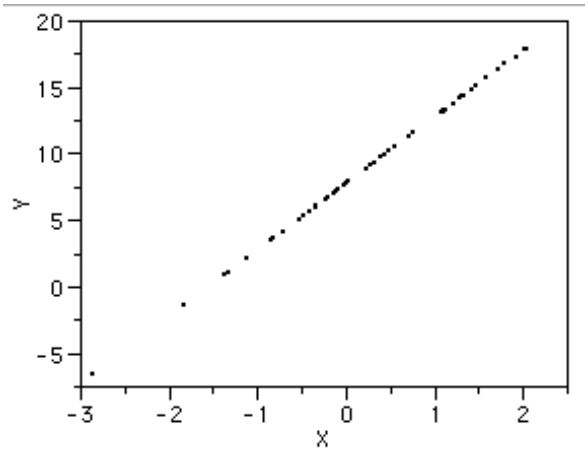


Figure 2 shows a perfect negative linear relationship. Notice that as X increases, Y decreases.

Figure 2. A perfect negative linear relationship, r = -1.

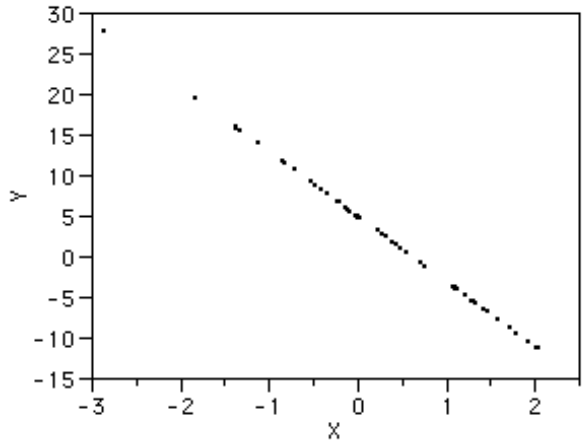
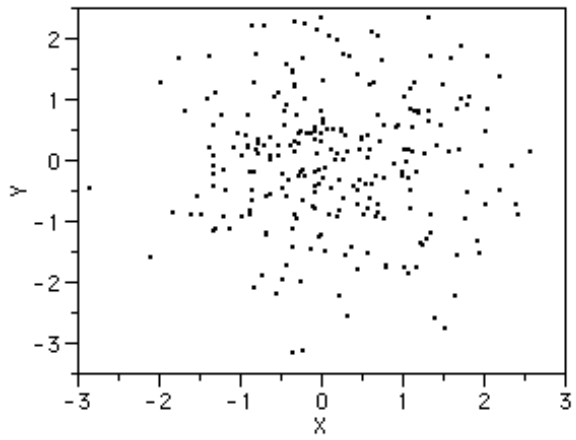


Figure 3 shows a scatter plot for which r = 0. Notice that there is no relationship between X and Y.

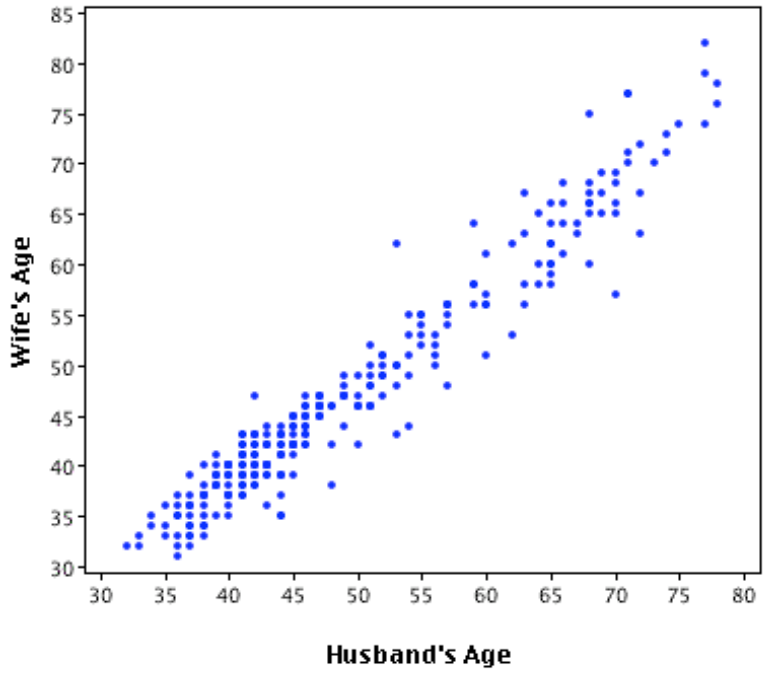
Figure 3. There is no linear relationship between the variables, r = 0.



With real data, you would not expect to get values of r of exactly -1, 0, or -1. The data for spousal ages shown in Figure 4 and described in the introductory

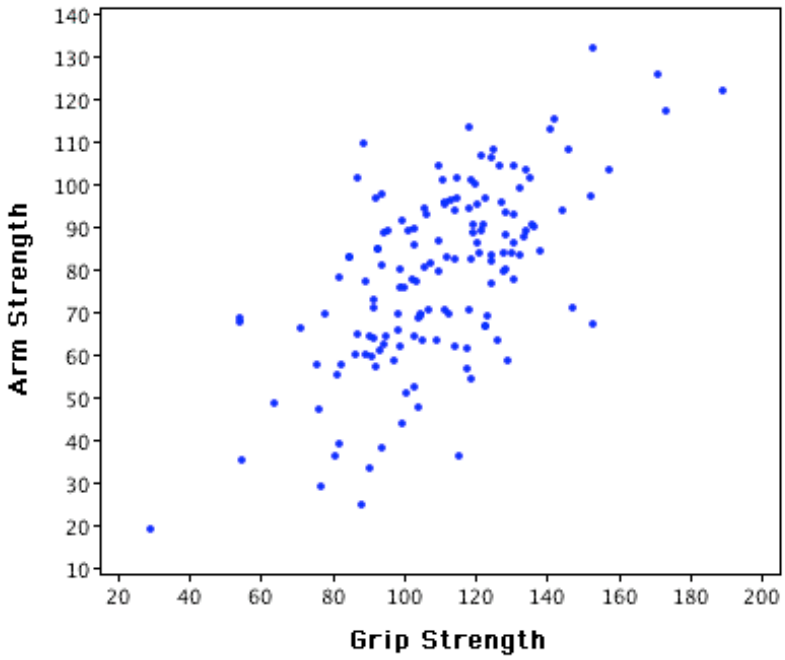
section has an r of 0.97.

Figure 4. Scatter plot of spousal ages, r = 0.97.



The relationship between grip strength and arm strength depicted in Figure 5 (also described in the introductory section) is 0.63.

Figure 5. Scatter plot of Grip Strength and Arm Strength, r = 0.63.


Arm Strength
Grip Strength
140
130
120
110
100
90
80
70
60
50
40
30
20
10
20
40
60
80
100
120
140
160
180
200