

Correlation Homework

3. For each of the following sets of scores,

SET 1		SET 2		SET 3	
X	Y	X	Y	X	Y
1	1	1	9	1	3
2	3	2	7	2	9
3	5	3	5	3	5
4	7	4	3	4	1
5	9	5	1	5	7

- a. Sketch a scatterplot showing the data, and describe the relationship between X and Y .

- b. Calculate the Pearson correlation. Does the obtained value correspond with your description?

5. When the Pearson correlation is computed for a restricted range of X values (or Y values), the obtained correlation can be very different from the correlation for the full range. Use the following data to demonstrate this fact:

X	Y
1	2
2	4
3	1
4	5
5	3
6	9
7	10
8	7
9	8
10	6

- a. Sketch a graph showing the X , Y points.
- b. Compute the Pearson correlation for the full set of data.
- c. Compute the Pearson correlation using only the first five individuals in the sample (the five smallest X values).
- d. Compute the Pearson correlation for the final five individuals in the sample (the five largest X values).
- e. Explain why the results from parts c and d are so different from the overall correlation obtained in part b.

8. A health psychologist is interested in the relationship between regular exercise and general health. A sample of six individuals is obtained. Each person is interviewed to determine how much exercise the person gets in an average week, and each person undergoes a physical exam to determine general health. A 10-point scale is used to rate both health and exercise, with higher scores indicating better health and more exercise. The data are as follows:

PERSON	EXERCISE RATING	HEALTH RATING
A	9	10
B	1	3
C	10	6
D	3	3
E	5	4
F	8	4

- a. Compute the Pearson correlation between exercise and health for these data.
- b. Can the psychologist conclude that regular exercise causes better health? Explain your answer.

14. Hunt and his colleagues (1975) have conducted several studies examining the relationship between intelligence and the speed of basic mental processes. In a typical experiment, Hunt measured reaction time for a simple mental task (e.g., determining whether two letters are the same or different) and then computed the correlation between the subjects' reaction times and their IQ scores. Hypothetical data representing the results of one experiment are as follows:

SUBJECT	IQ	REACTION TIME
A	118	238
B	124	198
C	105	220
D	98	216
E	115	223
F	128	206

- a. Compute the Pearson correlation between IQ and reaction time.
- b. Is the sample correlation significant at the .05 level?

15. A psychology instructor asked each student to report the number of hours he or she had spent preparing for the final exam. In addition, the instructor recorded the number of incorrect answers on each student's exam. These data are as follows:

HOURS	NUMBER WRONG
4	5
0	12
2	3
3	1
6	4

- Compute the Pearson correlation between study hours and number wrong.
 - Convert the original scores to ranks, and compute the Spearman correlation for these data.
 - Sketch a scatterplot for the original X and Y values and a scatterplot for the ranks. Notice that the extreme data point (0 hours and 12 wrong) has less influence after the data are ranked.
16. To test the effectiveness of a new studying strategy, a psychologist randomly divides a sample of 8 students into two groups, with $n = 4$ in each group. The students in one group receive training in the new studying strategy. Then all students are given 30 minutes to study a chapter from a history textbook before they take a quiz on the chapter. The quiz scores for the two groups are as follows:

TRAINING	NO TRAINING
9	4
7	7
6	3
10	6

- Convert these data into a form suitable for the point-biserial correlation. (Use $X = 1$ for training, $X = 0$ for no training, and the quiz score for Y .)
- Calculate the point-biserial correlation for these data.