

Chapter 4 Correlation and Regression

Section 4.1 Scatter Diagrams and Linear Correlation

Course Number

Instructor

Date

Objective:

In this section you learned how to make a scatter diagram, how to visually estimate the location of the “best-fitting” line, how to use sample data to compute the sample correlation coefficient r , and how to investigate the meaning of it.

Important Vocabulary

Define each term or concept.

Paired data values

Scatter diagram

Explanatory variable

Response variable

Sample correlation coefficient

I. Scatter Diagram

Studies of correlation and regression of _____ variables often involves a graph of paired data values _____.

In a _____, the data pairs (x, y) are plotted as individual points on a grid with _____ axis x and _____ axis y . The first variable in the pair is called the _____, and the second one is called the _____.

Focus Points

how to make a scatter diagram, and how to visually estimate the location of the “best-fitting” line

Example 1. For the paired data

x	12	17	18	20	25
y	18	19	19	20	21

- (a) Make a scatter diagram along with a line segment showing the basic trend.

(b) Comment on the relation between x and y .

Example 2. For the paired data

x	1	2	3	4	5
y	8	9	7	5	4

(a) Make a scatter diagram.

(b) When the x value increases, what happens to the y values in general?

(c) Does a line fit the data reasonably well?

(d) Draw a line that you think “fits best.”

II. Sample Correlation Coefficient r

The _____ is a numerical value that measures

Focus Point
the meaning of the
correlation coefficient

the strength of a linear relationship between two variables.

Determine whether each of the following statements is true or false.

- (a) The value of correlation coefficient r is always between -1 and 1 .
- (b) If r is positive, then y decreases as x increases.
- (c) If we change the position of x and y , that is, plot (y, x) instead of (x, y) , then the value of r will change.
- (d) The value of r does not change when either x or y is converted into different units.

III. Development of the Formula for r

One formula for computing r is _____.

Focus Point
how to compute the
sample correlation
coefficient r

IV. Computation Formula for r

Another formula for computing r is _____.

Example 3. Continue from Example 1. For the paired data

x	12	17	18	20	25
y	18	19	19	20	21

- (a) Do you expect to see a positive r ?
- (b) Compute the value of r .

Example 4. Continue from Example 2. For the paired data

x	1	2	3	4	5
y	8	9	7	5	4

- (a) Do you expect to see a positive r ?
- (b) Compute the value of r .

Additional Notes

Homework Assignment

Page(s)

Exercises