

12.3, 12.5 The Regression Equation and Prediction

Section 12.3, 12.5 The Regression Equation and Prediction

Learning Objective:

In this section, you will:

- Calculate, interpret, and appropriately apply the regression line between two sets of data

If a correlation exists between two variables, then a **regression line** (or regression equation) can be used to make predictions about those variables.

The equation: $\hat{y} = a + bx$ describes the relationship between x and y . b is the slope of the line, and a is the y-intercept.

You can find the regression line using the same **F:LinRegTTest** that we use to find r .

Example 1a: A random sample of ten professional athletes produced the following data where x is the number of endorsements the player has and y is the amount of money made (in millions of dollars).

x	0	3	2	1	5	5	4	3	0	4
y	2	8	7	3	13	12	9	9	3	10

Draw a scatter plot of the data and find the regression line and graph it on the same axes.

Predictions: If we find that there is a **linear correlation** between the two variables, we can use the regression line to predict y -values for given x -values. If there is **no linear correlation** between the two variables, then the best prediction for y is **the mean value, \bar{y}**

Example 1b: What is the best estimate for a y -value corresponding to an x -value of 6?

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Example 2: Concerns about global warming have led to studies of the relationship between global temperatures and the concentration of carbon dioxide. Listed below are the concentrations of carbon dioxide and temperatures for different years. Find the regression line. What is the best prediction for the global temperature when the carbon dioxide concentration is 320?

Carbon Dioxide	314	317	320	326	331	339	346	354	361	369
Temperature	13.9	14.0	13.9	14.1	14.0	14.3	14.1	14.5	14.5	14.4

1. Calculator work
2. Find a , b
3. Find the regression line
4. Find Critical Value and compare with r and state conclusion about linear correlation
5. What is the best prediction for the global temperature when the carbon dioxide concentration is 320?

Example 3: Listed below are brain sizes (in cm^3) and IQ scores of subjects. Find the regression line. If a person has a brain size of 1020 cm^3 , find the best predicted IQ score for that person.

Brain Size	965	1029	1030	1285	1049	1077	1037	1068	1176	1105	1029	1030
IQ	90	85	86	102	103	97	124	125	102	114	86	87

1. Calculator work
2. Find a , b
3. Find the regression line
4. Find Critical Value and compare with r and state conclusion about linear correlation

5. If a person has a brain size of 1020 cm³, find the best predicted IQ score for that person.

For more information and examples see online textbook OpenStax Introductory Statistics pages 685-691, 696-697.

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