



# Does A Correlation Exist?

## Student Activity

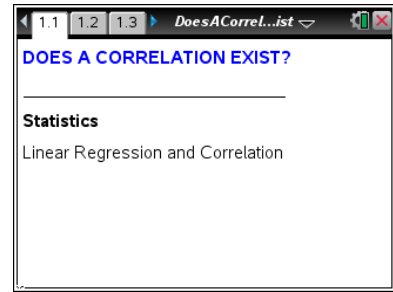


Name \_\_\_\_\_

Class \_\_\_\_\_

Open the TI-Nspire document *DoesACorrelationExist.tns*.

In this activity you will create graphs from lists of data and determine if the data sets have a positive or negative correlation coefficient. You will also determine the linear regression for each data set and calculate the correlation coefficients. You will then use the linear regression to predict the values of unknown data points.



### Problem 1 – Home Price and Square Footage

In this problem, you will examine how the selling price of a house is related to the square footage of the house. In the spreadsheet on page 1.2, two columns of data are given. One lists the selling price of houses (given in hundreds of dollars) and the second lists the square footage of the house.

1. Which variable is the independent variable? Which is the dependent variable? Explain.

On page 1.3, create the scatter plot.

2. Choose the type of correlation (one from each row).

Positive

Negative

Very strong

Moderately strong

Moderately weak

Very weak

3. Predict the value of the correlation coefficient. Explain your reasoning.

Calculate the linear regression equation on page 1.4. Select **MENU > Statistics > Stat Calculations > Linear Regression (mx+b)**. In the dialog box, choose your independent variable for the **X list** and your dependent variable for the **Y list**. Save your regression equation to **f1**. (This should be in the box already.) Ignore the other boxes.

4. What is the regression equation?

5. What is the correlation coefficient? How does it compare with your description of the correlation?  
How does your prediction compare?



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Return to the scatter plot on page 1.3 and graph the regression equation. Select **MENU > Analyze > Regression > Show Linear (mx+b)**. The line and its equation will appear.

- Determine the slope and y-intercept of the linear regression and describe what each means in the context of the data.

Use the regression equation to solve the following.

- Predict the price of a house that has 3,500 square feet.
- Predict the number of square feet for a house costing \$150,000.
- Predict the price of a house with 50,000 sq. ft. Does this prediction seem reasonable based on the data given? Explain.
- Predict the number of square feet for a house costing \$5.2 million. Does this prediction seem reasonable based on the given data? Explain.

### Problem 2 – Teacher Salary and Student Spending

On page 2.1, the spreadsheet contains two columns of data.. One lists the median teacher salary and the second lists the average spending per student in each of the fifty states.

- Which variable is the independent variable? Which is the dependent variable?
- Create the scatter plot on page 2.2. Describe the type of correlation.



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13. Predict the value of the correlation coefficient. Explain your reasoning.

On page 2.3, determine the linear regression equation.

14. What is the correlation coefficient? How does your prediction compare with the calculated correlation coefficient?

Return to the scatter plot and graph the regression equation. Use the regression equation to answer the following questions.

15. Predict the amount that a state will spend if the median teacher salary is \$40,000.

16. Predict the teacher salary for a state that spends, on average, \$1,500 per student.

17. Is there a relationship between these two variables? Is one dependent on the other? Does an increase in one mean an increase in the other? In other words, while there is correlation, is there causation?

### Problem 3 – Latitudes and Temperatures in January

On page 3.1, the data set is the latitude in degrees north of the equator and the average minimum January temp in °F (1931–1960).



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18. Which variable is the independent variable? Which is the dependent variable? Explain.
19. Create the scatter plot on page 3.3. Describe the type of correlation between the variables.
20. Predict the value of the correlation coefficient. Explain your reasoning.

On page 3.3, find the linear regression equation.

21. What is the correlation coefficient? How does your prediction compare? How does it compare with your description of the correlation?

Return to the scatter plot and graph the regression equation. Use the regression equation to answer the following.

22. Predict the temperature for a city with latitude 28.3.
23. Predict the latitude for a city with an average minimum temperature of 46°F.
24. Let's investigate what would happen if the temperatures were changed from Fahrenheit to Celsius. On page 3.4, create a third list that converts the temperatures to Celsius by entering a formula in the grey cell of Column C. Draw a new scatter plot on page 3.5 and find a new regression line on page 3.6. What happened?