



Monopoly and Regression

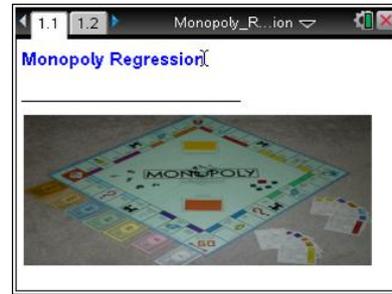
Student Activity

Name _____

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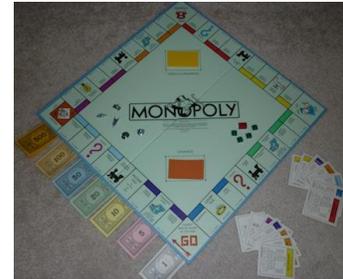
Open the TI-Nspire document *Monopoly_Regression.tns*.

Is there any relationship between the distance from Go and the cost of the properties in a standard Monopoly board game? In this activity, you will explore the answer to this question by analyzing the association between the number of spaces from GO and the cost of the corresponding property.



The following data are the number of spaces from GO and the cost of the property for each property on a standard Monopoly board.

Property	Spaces from GO	Cost
Mediterranean Avenue	1	60
Baltic Avenue	3	60
Reading Railroad	5	200
Oriental Avenue	6	100
Vermont Avenue	8	100
Connecticut Avenue	9	120
St. Charles Place	11	140
Electric Company	12	150
States Avenue	13	140
Virginia Avenue	14	160
Penn Railroad	15	200
St. James Place	16	180
Tennessee Avenue	18	180
New York Avenue	19	200
Kentucky Avenue	21	220
Indiana Avenue	23	220
Illinois Avenue	24	240
B & O Railroad	25	200
Atlantic Avenue	26	260
Ventnor Avenue	27	260
Water Works	28	150
Marvin Gardens	29	280
Pacific Avenue	31	300
North Carolina Avenue	32	300
Pennsylvania Avenue	34	320
Short Line Railroad	35	200
Park Place	37	350
Boardwalk	39	400



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Press **ctrl** **▶** and **ctrl** **◀** to navigate through the lesson.

Page 1.2 of the .tns file on the handheld shows a table of the data displayed above.

1. Use the scroll bar at the right to look through the data in the table.
 - a. Do you notice any trends or any noteworthy data values?



- b. Which variable would make sense to be the explanatory variable? The response variable? Explain your reasoning.
2. Insert a new page (1.3) by selecting **[doc]** > **Insert** > **Data & Statistics**.
- Create a scatterplot for the data by moving the cursor to the bottom center where it says **Click or Enter to add variable**.
 - Click on the text and select the variable **spaces**.
 - Move the cursor to the center of the left axis, and select **cost** as the variable.
3. a. Describe the association between the two variables.
- b. Describe any unusual points in your scatterplot.
4. Insert a new page (1.4) by selecting **[doc]** > **Insert** > **Lists & Spreadsheet**.
- Move the cursor to the shaded area in the second row of Column A.
 - Calculate the least squares regression line for the data by selecting **MENU** > **Statistics** > **Stat Calculations** > **Linear Regression (a+bx)**.
 - Press the right arrow for **X List:**, and choose **Spaces**.
 - Tab to **Y List:**, and choose **Cost**.
 - Press **[enter]** or select **OK**.
5. a. Write the equation that describes the relationship between the number of spaces from GO and the cost of the properties.
- b. Interpret the slope in terms of the context.
- c. Interpret the y-intercept. Does it have a meaning in this context? Explain your reasoning.

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6. On the scatterplot of the data, plot the least-squares regression line on your scatterplot by selecting **MENU** > **Analyze** > **Regression** > **Show Linear (a+bx)**.
7. How well does the line fit the data?



8. Interpret the correlation coefficient.
9. What is the meaning of the coefficient of determination, r^2 ?
10. Insert a new page (1.5) by selecting **doc** > **Insert > Data and Statistics**.
 - Create a residual plot by moving the cursor to the lower part of the screen until you see **Click or Enter to add variable**.
 - Select the variable **stat.yreg** (these are the predicted cost values).
 - Move the cursor to the left of the screen until you see **Click or Enter to add variable**, and select **stat.resid**.
11. Describe the residual plot. Based only on the residual plot, would you consider your original data to be approximately linear? Explain why or why not.

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12. In question 6, you displayed the least squares regression line on the scatterplot. If you removed the outliers from the scatterplot, predict how the regression line would change.

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13. On Page 1.2, delete the following data points for the railroad and utility properties: (5, 200), (12, 150), (15, 200), (25, 200), (28, 150), and (35, 200).
14. Return to Page 1.3, and answer these questions.
 - a. Was your prediction in question 12 correct? Explain your reasoning.
 - b. Describe the slope of the new regression line.



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15. Select **MENU > Window/Zoom > Zoom-Data**, and examine the new residual plot. Does it support a conclusion that the data are more linear? Explain your reasoning.

16. There is one unusual point in the upper right-hand corner. This is the residual for Boardwalk. Explain why it is so large in context of the problem.