

Assignment

Write

Describe the analytic and graphic representations you can use to determine whether a linear model is an appropriate fit for a data set.

Remember

When determining a line of best fit for a set of data, you must consider the graph, the correlation coefficient (r), and the residual plot. These three work together to help you assess the appropriate model of best fit.

Practice

1. The value of a new car starts to depreciate the minute a new owner drives it off the lot. The table shows the values of 15 used cars and their ages.

- Construct a scatter plot of the data.
- Write a function $P(x)$ to represent the line of best fit for the data. Graph and then interpret the line of best fit in terms of the problem situation.
- Does the line of best fit appear to be a good model for this data set? Explain your reasoning.
- Calculate the residuals for the data to the nearest whole number and create a residual plot of the data.
- Based on the residual plot, do you think a linear model is a good fit for the data? Why or why not?
- The quadratic function $f(x) = 63.2x^2 - 1666.6x + 13,455.8$ also represents this data set. Graph this function on the same graph as the scatter plot and line of best fit. Does it appear to fit the data better than the line of best fit?
- Calculate the residuals for the function $f(x)$ and create a residual plot of the data. What does the residual plot tell you about the quadratic model used for the data?

Age of Car (years)	Price (dollars)
1	11,500
2	10,500
3	9100
4	8000
5	7500
6	5100
9	3000
11	3000
11	2900
13	2500

Stretch

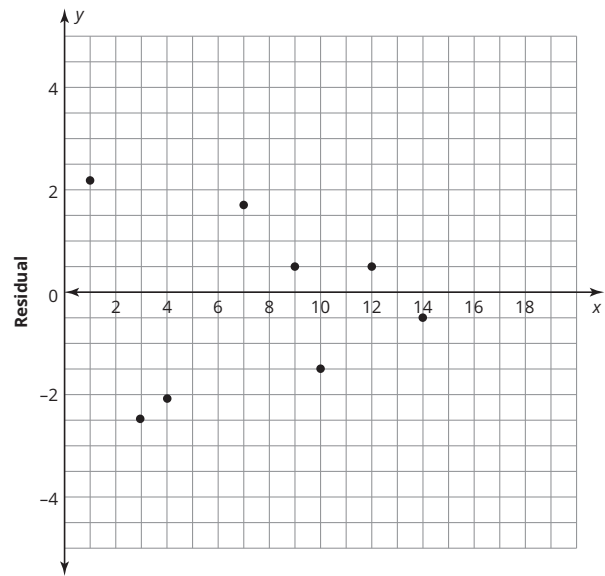
1. The table shows the population of Lakewood over an eight year period.
- Construct a scatter plot of the data.
 - Based on the shape of the scatter plot, determine if a linear model is a good fit for the data.
 - Determine the type of model that you would use if the population in 2017 is 27,500. Explain your reasoning.
 - Determine the model that you would use if the population in 2017 is 29,876.
 - Based on your answers to parts (c) and (d), discuss the influence of one point on determining a model of a data set.

Year	Population
2009	16,450
2010	17,220
2011	18,490
2012	19,222
2013	21,365
2014	22,161
2015	24,987
2016	27,001

Review

1. Students collected data on the earnings of teenagers aged 13 through 18 who work outside of school, and the number of hours they work in a week. The line of best of fit, $y = 8.25x + 35.7$, where x represents the number of hours worked, and y represents the earnings in dollars, was calculated for the data. One teenager in the study works 15 hours a week and earns \$119.95. Determine the residual for the data point and explain the meaning in words.

2. Consider the residual plot.



Determine whether the plot indicates that there is a possible linear relationship between the data. Explain your reasoning.

3. The population of a sunflower field is initially 60 plants. Each year the population grows 14%. Use the explicit formula to determine how many sunflower plants will be in the field in 6 years.
4. The graph shows two different lines. Which line has the steeper slope? Explain your reasoning.
5. Determine the slope and y-intercept of the graph shown.

