



**Solutions**

**Algebra II Journal**

**Module 1: Linear, Quadratic and Exponential Regression**

**A Good Enough Fit?**

**This journal belongs to:**



## Module 1: A Good Enough Fit?

**Algebra II Journal: Reflection 1**

Use the line of best fit to calculate the estimated winning times and residual values in the table below. Submit your responses to your teacher.

**Answers:**

<b>Years since 2007</b>	<b>Winning time (minutes)</b>	<b>Estimated Winning Time (from Line of Best Fit)</b>	<b>Residual Value (Actual – Estimated)</b>
0	16.33	16.8	<b>-0.47</b>
1	16.77	16.756	<b>-0.014</b>
2	17.5	<b>16.712</b>	<b>0.788</b>
3	16.77	<b>16.668</b>	<b>0.102</b>
4	16.35	<b>16.624</b>	<b>-0.274</b>
5	16.42	<b>16.536</b>	<b>-0.16</b>

## Module 1: A Good Enough Fit?

### Algebra II Journal: Reflection 2

Now that you have found an equation for line of best fit and made a prediction for the 2014 winning time, it is time to assess the estimated value. Respond to this reflection question and submit your reflection to your teacher.

**How accurate is the estimated winning time for 2014? Why?**

#### **Answer:**

Responses to the question about evaluating the reasonableness of cross country estimated winning times will vary. Students should anticipate that the reasonableness is not very high. The line of best fit does not strongly fit the data, making predictions less accurate. If the data is available, have students compare the prediction to the actual winning time. Also, consider changing the prediction year to make the prediction more relevant to students.

## Module 1: A Good Enough Fit?

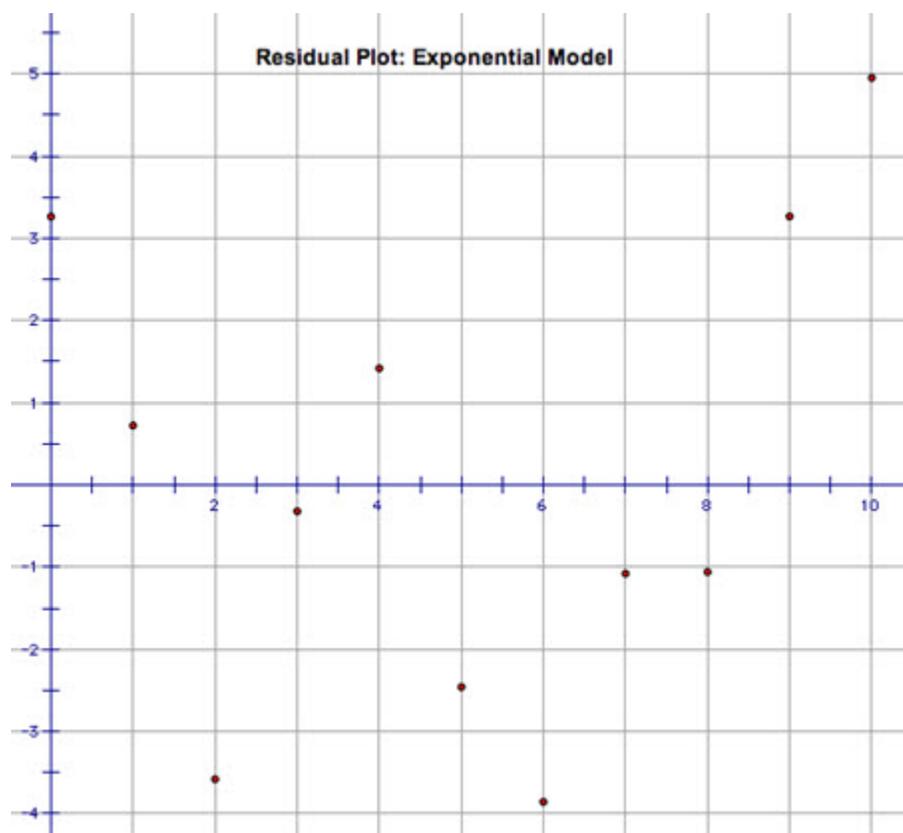
**Algebra II Journal: Reflection 3**

In this lesson, you learned how to analyze a fit for a data set using residuals and, for linear models, correlation coefficient. Respond to the following reflection questions and submit to your teacher.

**Calculate and plot the residuals for the exponential model of best fit. Is Marissa making a reasonable conclusion that an exponential model is a good fit for her data? Why or why not?**

**Answer:**

Here is the residual plot for the exponential model  $f(x) = 74.737(1.101)^x$ .



The residual plot is random and values are fairly small. The curve appears to fit the data better. Considering this is a cooling curve, this is a reasonable model for the data.

## Module 1: A Good Enough Fit?

**How can you determine if a linear regression equation is the best fit for a data set?**

**Answer:**

For linear models, inspection of the residuals plot and correlation coefficient are necessary to determine whether a linear model is the best fit for a data set. The residuals should appear random and should be as small as possible. The correlation coefficient should be as close to either 1 or -1 as possible.

**What are residuals? How can we use residuals to analyze the fit for a model?**

**Answer:**

Residuals are the vertical distances between the actual data value and the expected data value. The smaller and more random the residuals are, the better the fit of the model.