

Pratik Gandhi, Mr. Tom Weiderman
 GK-12: AP Statistics at Gardner High School

Summary:

Students were learning about curve fitting, and they were confused about the re-expressing the data points, so that they look linear. So I took the example from their book about planet distances, and used those data points, which initially looked like exponential increase. And I explained that how to use log scale to linearize the data points. Also informed them how to figure out which axis should be converted to log scale. Then we started discussing about residuals; how it can be used to determine the variation accounted for in the model. Used MATLAB GUI to show them how the residual is calculated. I also made them clear about which point is consider an outlier, and which one is not. Residual plot can also help answering that question. Mr. Weiderman and I talked about importance of using R^2 value in real world applications such as manufacturing. I also mentioned how std, mean and z-scores, correlation is used in communication engineering.

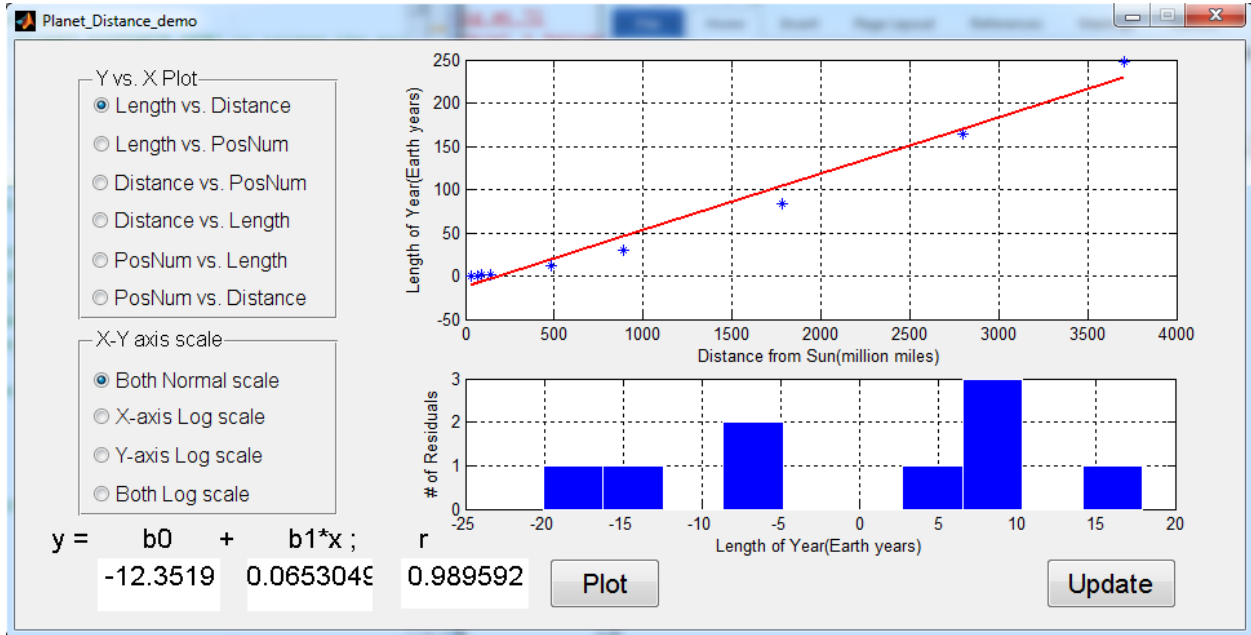
Period: **Class: Linear Regression, Residuals**

Date(s): October 25 – November 1, 2012

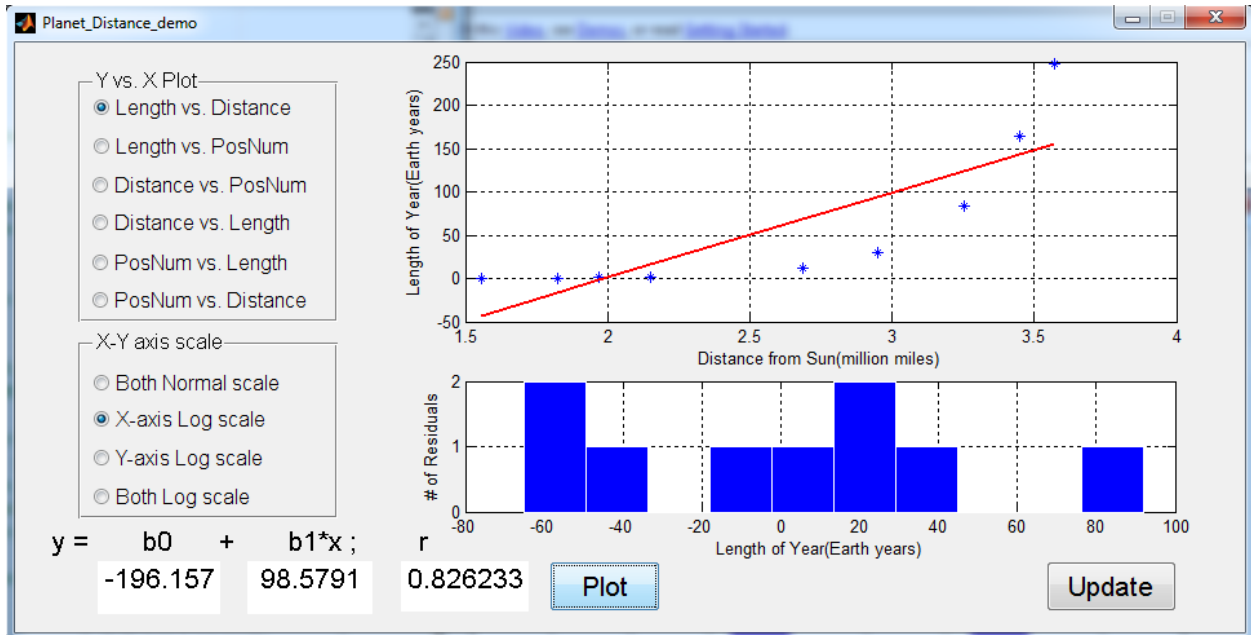
SETTING THE STAGE	
<u>Essential Question</u>	What makes millions of people around the world to talk to each other on cell phones
<u>Content Objective(s)</u> (Student-friendly)	We should be able to understand curve fitting, residual.
<u>Connection to previous or future lessons</u>	Can lead to randomness.
<u>Critical Thinking Questions</u>	What is linear regression line? What kind of information does residual plot give you?
<u>Key Vocabulary</u>	Linear regression line, residual
<u>Materials Needed/Safety</u>	Computers, MATLAB

ACTIVE INSTRUCTION	
<ul style="list-style-type: none"> • Launch (Engage) 	<p>Discuss about curve fitting and when to use regression line. Linearizing the exponential plot, so that linear regression line can be used.</p> <p>Then start discussing about residual plot, how is it important</p>
<ul style="list-style-type: none"> • Investigation (Explore) 	<p>What is a regression line? How to linearize the data?</p>
TIME FOR REFLECTION	
<ul style="list-style-type: none"> • Summarization (Explain & Extend) 	<p>Summarize them about re-expressing the data, so that linear model can be used, and also revise the importance of residuals.</p>
<ul style="list-style-type: none"> • Assessment (Evaluate) 	<p>Ask them to write or discuss about what they learned about linear regression and residuals.</p>
<ul style="list-style-type: none"> • Homework 	<p>None.</p>

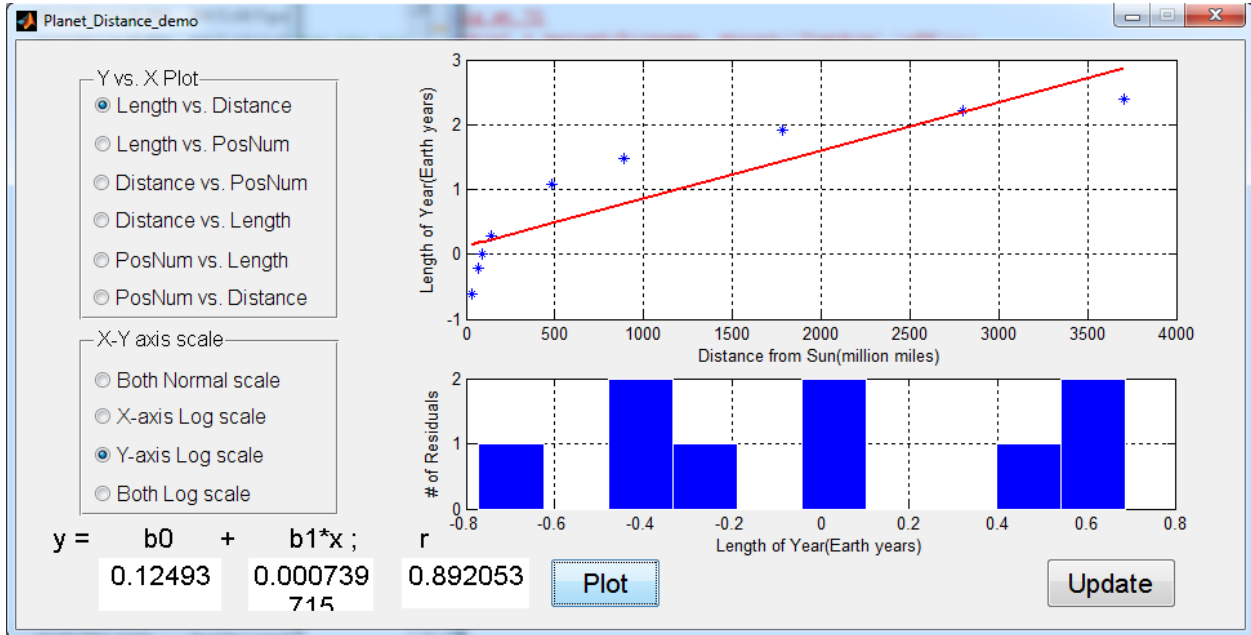
Normal Plot (Length of a year vs. Distance from the Sun)



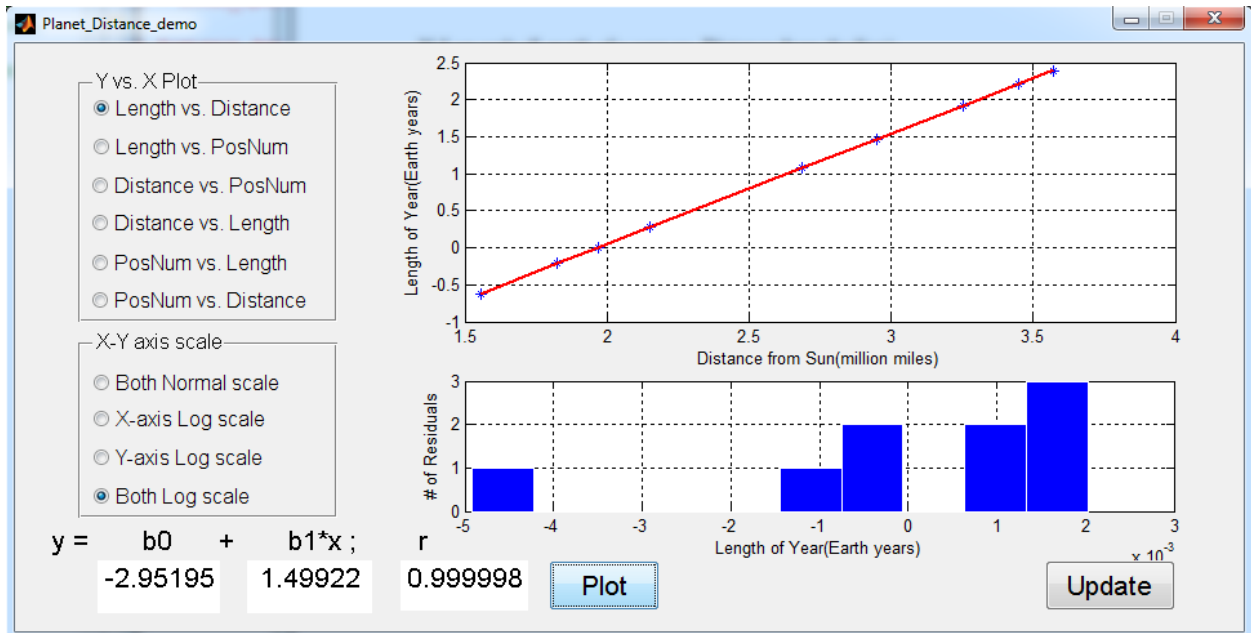
X-Log scale (Length of a year vs. Distance from the Sun)



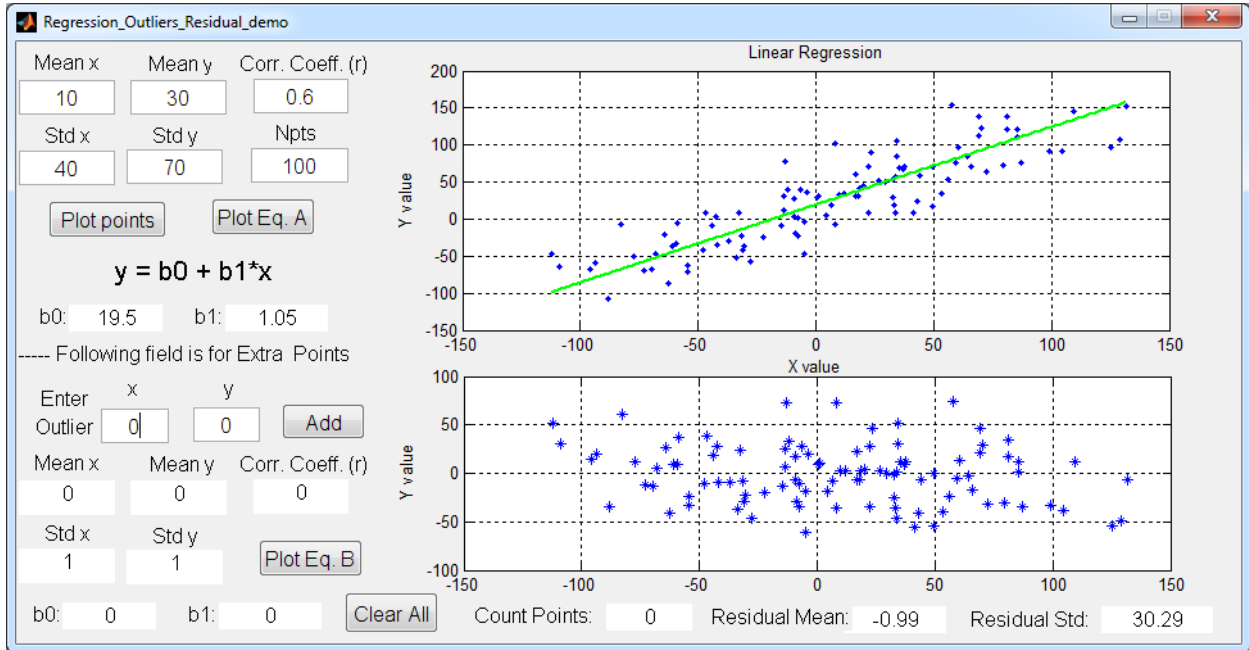
Y-Log scale (Length of a year vs. Distance from the Sun)



Both Log scale (Length of a year vs. Distance from the Sun)



Regression line with residual plot



Impact of 5 outlier points

