



# Residuals

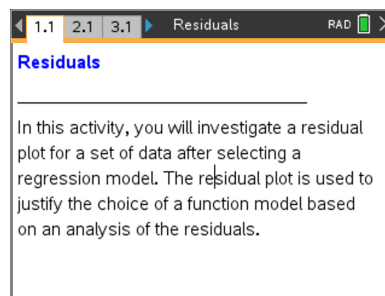
## Student Activity

Name \_\_\_\_\_

Class \_\_\_\_\_

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

In this activity, you will investigate a residual plot for a set of data after selecting a regression model. The residual plot is used to justify the choice of a function model based on an analysis of the residuals.



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### Part 1

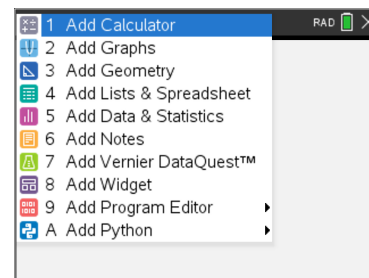
Use the following data set in Part 1.

<b>x</b>	-1	0	2	5	7	10
<b>y</b>	-7	-4	-1	6	8	16

1. Enter the x values in the column labeled *xvalue*. Enter the y values in the column labeled *yvalue*.

Add a page by pressing **ctrl** **doc.v** > Add Calculator. Press **menu** . > Statistics, > Stat Calculations, > Linear Regression (mx + b). For X List: select *xvalue* and for Y List: select *yvalue*. Press enter for OK..

What is your linear regression equation?



2. Add a page by pressing **ctrl** **doc.v** . > Add Data & Statistics. Click in the lower gray region to select *xvalue* and click in the left gray region to select *yvalue*.

**Note:** To show the graph of the linear regression equation, press **menu** . > Analyze, >Regression, and > Show Linear (mx + b). To hide the graph of the linear regression equation, , press **menu** and >Analyze, >Regression, and >Hide Linear (mx + b).

The residual is the actual value minus the predicated value. A regression model is justified as appropriate for a data set if the residuals of a regression, the residual plot, appear without pattern. To view the residual plot, click in the left gray region and select stat.resid.

Does your residual plot have a pattern? Would a linear regression be appropriate for this data set?



3. Add a page by pressing  $\boxed{\text{ctrl}} \boxed{\text{doc}} \downarrow$ . >Add Calculator. To evaluate the predicted values, type  $f1(-1)$  and then calculate the residual when  $x$  is  $-1$ . Calculate  $f1(0)$  and then calculate the residual when  $x$  is  $0$ . Notice that one residual value is negative and one is positive. What does this tell us about the predicted value as being an underestimate or an overestimate?

**Note:** To view the residual list for all of the data points, press  $\boxed{\text{var}}$  and > stat.Resid. Scroll to the right to see more values.

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**Part 2**

Use the following data set in Part 2.

<b><i>x</i></b>	-1	0	1	2	4	5
<b><i>y</i></b>	0.2	0.6	0.9	2.1	7.9	16.2

4. Follow the steps in Part 1. Enter the  $x$  values in the column labeled *xvalue*. Enter the  $y$  values in the column labeled *yvalue*. Compute a linear regression, view the scatter plot, and view the residual plot. Does your residual plot have a pattern? Would a linear regression be appropriate for this data set?
5. Now compute an exponential regression. Add a page by pressing  $\boxed{\text{ctrl}} \boxed{\text{doc}} \downarrow$ . Select > Add Calculator. Press  $\boxed{\text{menu}}$ . Select > Statistics, >Stat Calculations, then > Exponential Regression. View the residual plot. Does your residual plot have a pattern? Would an exponential regression be appropriate for this data set?