30. TECHNOLOGY CORNER

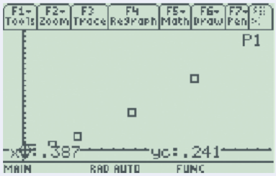
TRANSFORMING TO ACHIEVE LINEARITY ON THE CALCULATOR

TI-Nspire instructions in Appendix B; HP Prime instructions on the book's Web site.

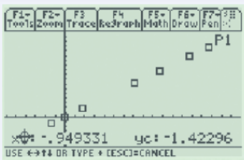
We'll use the planet data to illustrate a general strategy for performing transformations with logarithms on the TI-89. A similar approach could be used for transforming data with powers and roots.

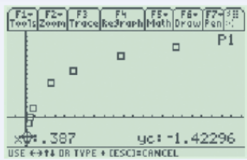
TI-89

- Enter the values of the explanatory variable in L1/list1 and the values of the response variable in L2/list2. Make a scatterplot of *y* versus *x* and confirm that there is a curved pattern.

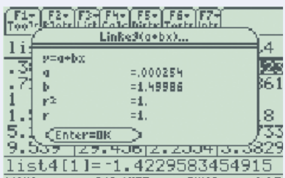


- Define L3/list3 to be the natural logarithm (ln) of L1/list1 and L4/list4 to be the natural logarithm of L2/list2. To see whether a power model fits the original data, make a plot of ln *y* (L4/list4) versus ln *x* (L3/list3) and look for linearity. To see whether an exponential model fits the original data, make a plot of ln *y* (L4/list4) versus *x* (L1/list1) and look for linearity.

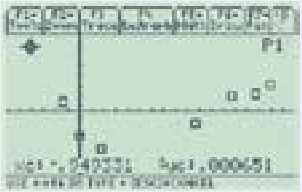




- If a linear pattern is present, calculate the equation of the least-squares regression line and store it in Y1. For the planet data, we executed the command `LinReg(a+bx)L3,L4,Y1`.



Construct a residual plot to look for any departures from the linear pattern. For Xlist, enter the list you used as the explanatory variable in the linear regression calculation. For Ylist, use the RESID list stored in the calculator. For the planet data, we used L3/list3 as the Xlist.



- To make a prediction for a specific value of the explanatory variable, compute log *x* or ln *x*, if appropriate. Then use Y1(*k*) to obtain the predicted value of log *y* or ln *y*. To get the predicted value of *y*, use 10^Ans or *e*^Ans to undo the logarithm transformation. Here's our prediction of the period of revolution for Eris, which is at a distance of 102.15 AU from the sun: