

9. INTRODUCING STATISTICS: MOBILE REGRESSIONS

In this activity, you will explore some of the possibilities available for learning and teaching with an integrated technological partner! Not only is it quick and easy to compute and plot regressions, but the linked representations available within TI-Nspire™ CAS learning technology make it a powerful tool for building a deep and lasting conceptual understanding of the principles and processes involved.

This activity was originally developed by Dr. Charles Vonder Embse from Central Michigan University.

Beginning with a new document and a *Graphs & Geometry* page, first hide the **Entry Line** by pressing $\text{ctrl} + \text{G}$. Choose **Zoom – Quadrant 1** from the Window menu, and use the **Point** tool (\bullet) from the Points & Lines menu to place five free points in the first quadrant. To label a point, simply type a label immediately after placing the point (and before placing the next point).

Use the **Coordinates & Equations** tool ($\frac{x}{y}$) (**MENU > Tools > Coordinates & Equations**) to show the coordinates of each point. After labeling the points in this way, you can double-click on each coordinate to assign a specific value to it. (It is helpful to “fix” the number of decimal places in each value, thus freeing up space on the screen.)

Click once on any x-coordinate to select it. Open the **Variables** menu by pressing $\frac{\text{stop}}{\text{Var}}$ (or by pressing $\text{ctrl} + \text{L}$) and **Store** each of the x- and y-coordinates in turn as (**xa, ya**), (**xb, yb**), (**xc, yc**), etc.

Check that as you move your points, their coordinates change to reflect their new positions. You may then hide the coordinates by using the **Hide/Show** tool (eye) (**MENU > Tools > Hide/Show**).

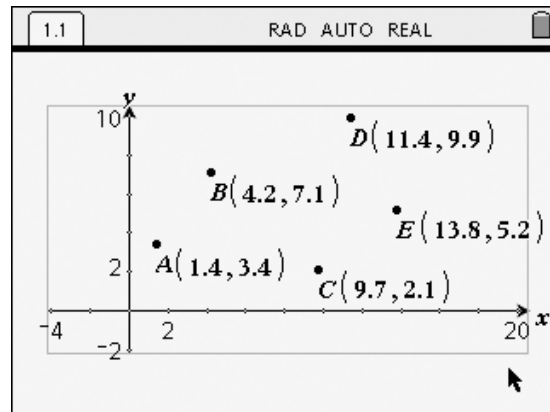


Figure 9.1: Dropping Some Points

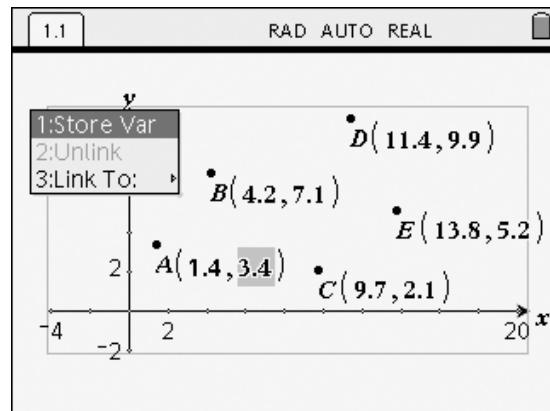


Figure 9.2: Storing Coordinates as Variables

Now insert a new *Lists & Spreadsheet* page. With cell **A1** selected, press $\text{ctrl} + \text{L}$ to access the **variables** menu and **Link To** the variable **xa**. Repeat this process, storing each of the x-variables in Column A and each of the corresponding y-variables in Column B. When completed, each cell should appear gray to show that it contains a linked value.

Select Columns A and B by using **MENU > Actions > Select** and the **SHIFT** key. Now perform a linear regression of the form $y = mx + b$ by choosing **MENU > Statistics > Stat Calculations > Linear Regression (mx + b)**. Columns A and B will already be entered as the X and Y Lists; enter "d[]" for the "1st Result Column" and press enter .

The statistical variables from this computation are deposited in Columns D and E. Since we are planning for several regressions, we will store these under other names to avoid writing over the key variables.

As displayed in Figure 9.4, copy the slope (**m**) and y-intercept (**b**) into new cells and store them. To do so, simply type "=E3" into F3. Similarly, copy the contents of cell E4 into F4. Open the **Variables** menu ($\text{ctrl} + \text{L}$) and **Store** these two values as **lm** and **lb**.

Return to the *Graphs & Geometry* page and enter the equation **lm*x + lb** as **f1(x)**. (Press $\text{ctrl} + \text{G}$ to show/hide the **Entry Line** as needed.) After this line has been graphed, you may wish to use **Hide/Show** to hide its label.

Moving any of the points A through E will cause changes in the regression line to fit.

Now go back and create more regression lines in the same manner, such as a **Median** and a **Quadratic regression** and observe the ways in which various positions of the points affect each regression!

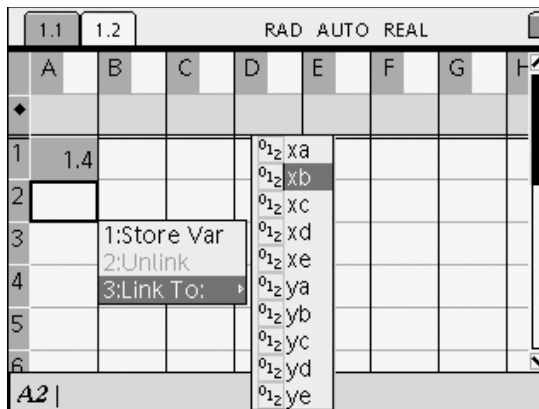


Figure 9.3: Linking to Variables from L&S

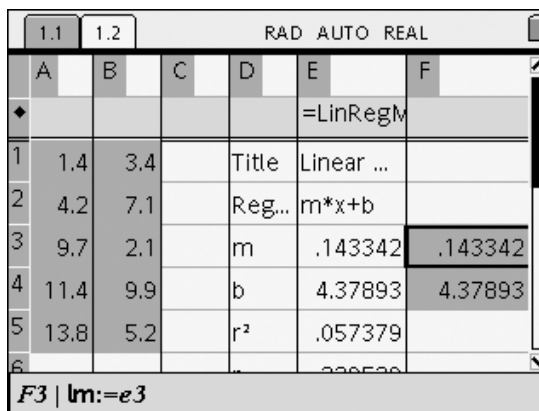


Figure 9.4: Storing Regression Values

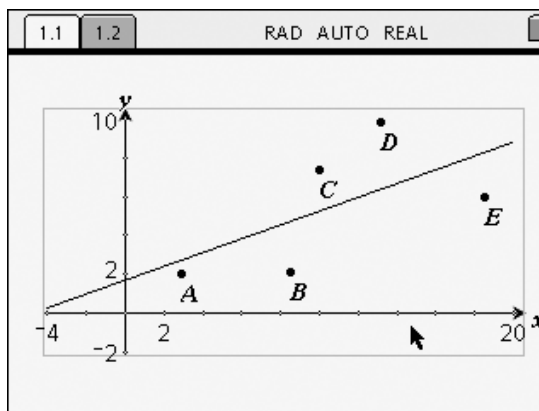


Figure 9.5: A Mobile Regression Line!