Drawing a Scatterplot and
Finding the Line of Best Fit (Linear Regression Equation)*

Instructions for the TI-84 Plus

*Before working this problem be sure to work through the worksheet, *Preparing the Calculator for Regression*. **Plot1** must be turned on.

The following example is taken from the textbook "College Algebra Graphs & Models, Third Edition" by Bittinger, Beecher, Ellenbogen, and Penna.

Example: Problem #81 on page 119. *"Maximum Heart Rate"* A person who is exercising should not exceed his or her maximum heart rate, which is determined on the basis of that person's sex, age, and resting heart rate. The following table relates resting heart rate and maximum heart rate for a 20-year-old man.

a) Use a graphing calculator to model the data with a linear function.

b) Estimate the maximum heart rate if the resting heart rate is 40.

Fig. 1

Resting Heart Rate, H (In Beats Per Minute	Maximum Heart Rate, M (In Beats Per Minute
50	166
60	168
70	170
80	172

First, we need to enter the data into the calculator. We are working with statistics, so press STAT to enter the statistics menu. You will see the screen that is shown in figure 2. We want to EDIT the data, so press ENTER for Edit. The result will be the screen shown in figure 3.

Fig. 2

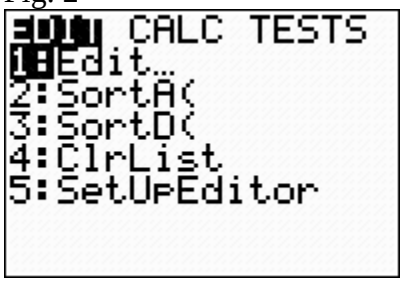
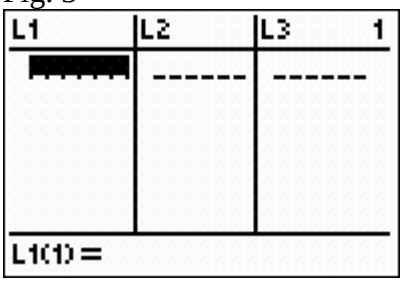


Fig. 3



(If there are any numbers in **L1** or **L2** use ▲ to highlight **L1** or **L2**, then press CLEAR, then ENTER. This will clear out any previous data. Press ▶ and ◀ to move between columns.)

Once the **L1** and **L2** columns are cleared out, you are ready to input the data. Place the cursor in the **L1** column. Type in [5] [0] [ENTER], [6] [0] [ENTER], [7] [0] [ENTER], then [8] [0] [ENTER].

Place the cursor in the **L2** column. Type in [1] [6] [6] [ENTER], [1] [6] [8] [ENTER], [1] [7] [0] [ENTER], and [1] [7] [2] [ENTER]. This will result in the screen in figure 4.

Fig. 4

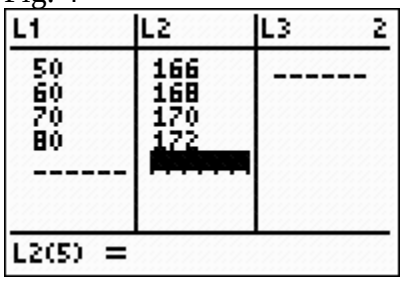
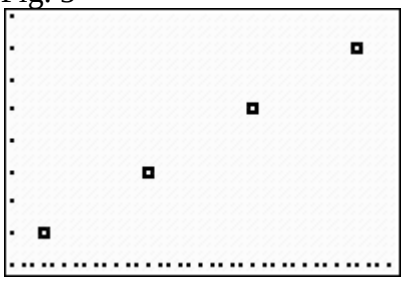


Fig. 5



To plot these points on a graphing window that contains these values, Zoom Statistics by pressing [ZOOM] [9]. This will result in the scatterplot shown in figure 5.
Now we want to CALCULATE the equation of the line that fits this data the best. This line of best fit can be found using linear regression. To calculate with statistics, we enter the statistics menu by pressing [STAT]. The enter the calculate menu by pressing [›]. You should have the screen shown in figure 6.

Fig. 6

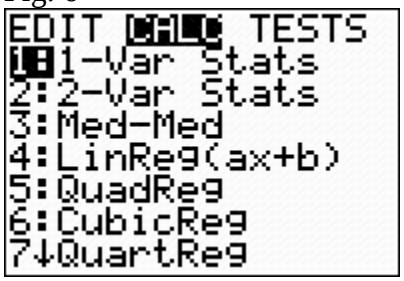
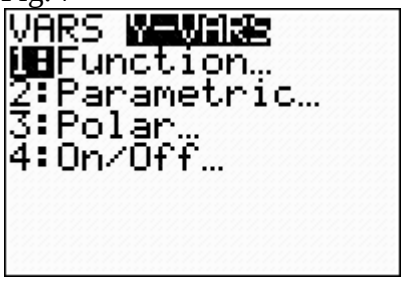


Fig. 7



We want to calculate a Linear Regression, so select **LinReg(ax+b)**. You can do this by pressing [4] to select LinReg(ax+b) or press [⌄] to 4 then press [ENTER]. Now we want to tell the calculator where to store this answer. We want to store it in Y1 of the equation editor. Y1 is a y-variable, so press [VARS] to access the variables menu. Then press [›] to access the **Y-VARS** menu, as shown in figure 7.

Y1 is a function, so press [ENTER] to get the screen shown in figure 8. Press [ENTER] again to select Y1. The screen should look like figure 9.

Fig. 8

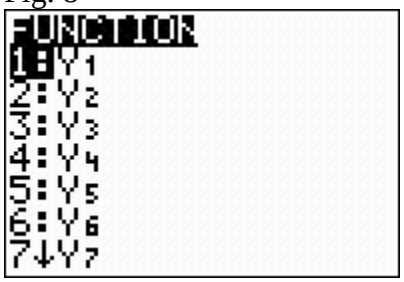
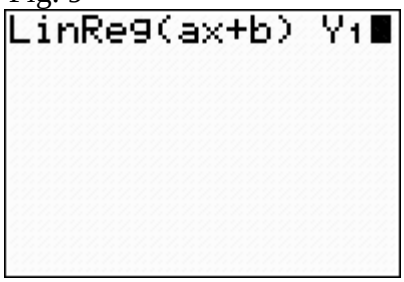


Fig. 9



Press ENTER to calculate the Linear Regression values. This will result in figure 10. From this, we see that the linear function is $f(x) = 0.2x + 156$.

Fig. 10

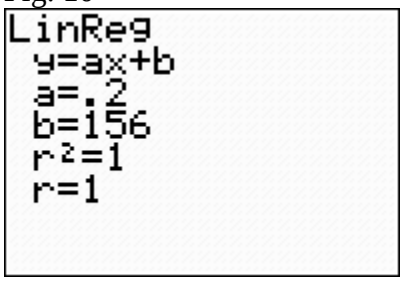
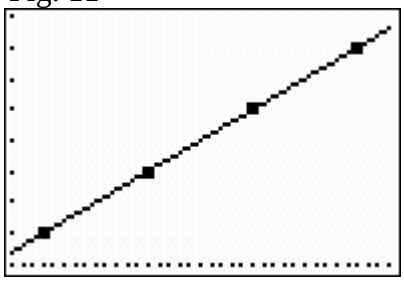


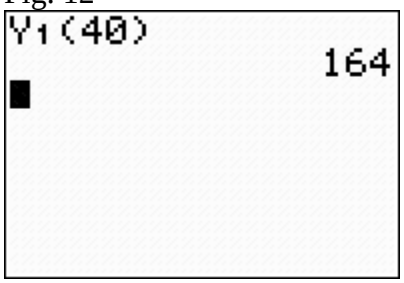
Fig. 11



The $\mathbf{Y_1}$ from our previous instruction will paste the regression equation into the equation editor. Press GRAPH to graph the regression equation on top of your scatterplot. The result is shown in figure 11.

To estimate the maximum heart rate if the resting heart rate is 40, we need to evaluate $f(40)$. However, in the calculator, we called this function Y_1, so we need to evaluate $Y_1(40)$. Return to the home screen by pressing 2nd MODE. Y_1 is a y-variable that is a function, so we need to access Variables (press VARS), Y-variables (press ›), Function (press ENTER), and Y_1 (press ENTER again). Then we need to tell the calculator to evaluate Y_1 at 40, so press (4 0). Press ENTER to tell the calculator to evaluate the expression. This will result in figure 12.

Fig. 12



When the resting heart rate is 40 beats per minute, the maximum heart rate is 164 beats per minute.