TI Technology Guide for *Cropland Value Grows*

TI-83 Plus and TI-83 Plus Silver Edition

Creating Lists of Data, Displaying the Graph, Using the Regression Capabilities of the Handheld, Using Equation Solver, Using Science Tool App

Press [STAT] and select **1:Edit** to access the List Editor window. Be sure to clear any existing data in the lists by highlighting the list name, then pressing [CLEAR] [ENTER].

Move the cursor to the first data position in L1 and enter the years from the "Cropland value grows" graphic. Move the cursor to the first data position in L2 and enter the corresponding dollar values.

To insure all the data points are visible, press [WINDOW] and enter values for the x-axis and y-axis that contain the range of values from the graphic (see screenshot for example values).

Press [GRAPH] to view the data. L1 (years) are on the horizontal axis, and L2 (dollars) are on the vertical axis. Press [TRACE] and use the arrow cursor keys to read the values of the data points.
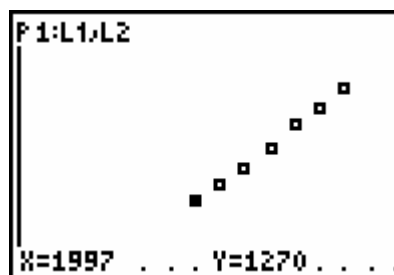
To use the regression capabilities, press STAT ▶ to access the CALC menu. Select **4:LinReg(ax+b)**, since the graph appears to best be described as linear.

```
EDIT CALC TESTS
1:1-Var Stats
2:2-Var Stats
3:Med-Med
4▉LinReg(ax+b)
5:QuadReg
6:CubicReg
7↓QuartReg
```

At the blinking cursor, press
2nd STAT **1: L1** ENTER
, (above the 7)
2nd STAT **2: L2** ENTER ,
VARS ▶ ENTER to display the VARS Y-VARS FUNCTION secondary menu, and then select **1:Y1**. L1, L2, and Y1 are pasted to the home screen as arguments to LinReg(ax+b).
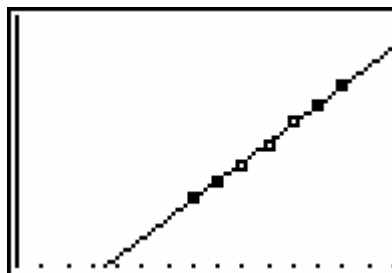
```
LinReg(ax+b) L₁,
L₂,Y₁
```

Press ENTER to execute LinReg(ax+b). The linear regression for the data in L1 and L2 is calculated. Values for a and b are displayed on the home screen. The linear regression equation is stored in Y1.

```
LinReg
 y=ax+b
 a=76.42857143
 b=-151362.8571

▉
```

Press GRAPH. The regression line and the scatter plot are displayed simultaneously.

Press Y= to view the equation. Notice that Plot 1 is highlighted, which indicates that the data points for L1 and L2 are showing on the graph. The **=** beside Y1 is also highlighted, which indicates that the linear function determined by the regression capabilities is also showing on the graph. Pressing ENTER when the cursor is in either of these highlighted areas acts as a toggle to turn on or off the display of that component on the graph.

```
Plot1 Plot2 Plot3
\Y1◼76.428571428
571X+-151362.857
14285
\Y2=
\Y3=
\Y4=
\Y5=
```

Deselect the Plot 1 so that only the linear function is graphed.

The predicted average value per acre in dollars for 2004 can be viewed from the graph using TRACE and the right arrow cursor key until the x value is 2004. The corresponding y-value for the average dollar value per acre can be read. (Values may vary slightly based on the screen pixel that the trace feature uses.)
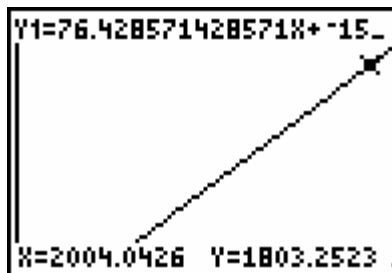
A second way to display corresponding data in the TRACE screen is by entering the x value on the keypad. For example, enter 2004 and the screen will automatically display it as the x value.
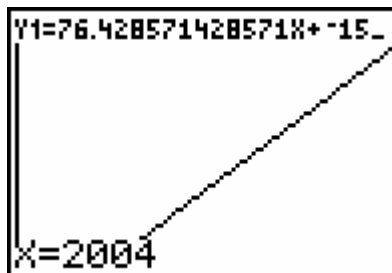
Press ENTER and the corresponding dollar value is displayed.
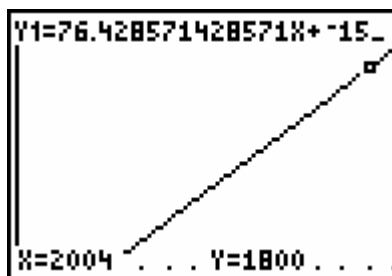
A third way to view the corresponding data is to use the table view. To access this feature, press 2nd WINDOW. The TABLE SETUP screen will display the lower x value in your current window setting. A sample is shown. The TblStart=1990 indicates the lower x value of the window setting and ΔTbl=1 indicates intervals of 1.

Press 2nd GRAPH to show the table with corresponding values of the years and average dollars per acre. Scrolling with the cursor keys reveals values for the linear function (Y1) at 1-year intervals.

NOTE: The values of Y1 using this table and the trace feature identify the average value per acre in 1996 to be approximately 1188.6. The average value per acre numbers provided in the Teacher Edition for the years 1996 and 2004 were found using a truncated value of 76.43 for the x coefficient in the function.

The predicted average dollar value per acre can also be calculated using the Equation Solver. To access the solver, press [MATH] and select **0:Solver**. Since the solver places all variables on one side of the equal sign with the total value of 0, you need to enter the unknown value of Y and subtract Y1. Press [ALPHA] [Y] [−] [VARS] and select Y-VARS, **1:Function**, **1:Y1**.

```
EQUATION SOLVER
eqn:0=Y-Y₁
```

Move the cursor to the X= line and enter the date 2004. Move back up to the Y= line and press [CLEAR].

```
Y-Y₁=0
  Y=█
  X=2004
  bound={-1ᴇ99,1…
```

Now press [ALPHA] [SOLVE] to solve for Y when X=2004.

You can repeat these last 2 steps to find the dollar value for 1996.

```
Y-Y₁=0
•Y=1800.00000001
  X=2004
  bound={-1ᴇ99,1…
•left-rt=0
```

The Data/Graphs Wizard of the Science Tools App can be used to enter data into lists and graph the functions. Press [APPS] [SciTools]. On the SELECT A TOOL menu screen, select **3: DATA/GRAPHS WIZARD**.

```
SELECT A TOOL
1:SIG-FIG CALCULATOR
2:UNIT CONVERTER
▓:DATA/GRAPHS WIZARD
4:VECTOR CALCULATOR

(EXIT)
```

Use the function keys under the tabs on the screen to select the action you want to take. Selecting DATA provides the List Editor screen. Follow the steps shown above for entering the data. To return to this main screen, press [2nd] [ENTER].

```
DATA/GRAPHS WIZARD

DATA = NEW/EDIT DATA
  ⌐ = PLOT DATA
STAT = ANALYZE DATA

(DATA)(⌐)(STAT)
```

Pressing the PLOT DATA tab reveals 4 plot options. Select the SCATTERPLOT tab. Identify L1 as the independent variable and L2 as the dependent variable. The scatter plot will automatically be displayed in an optimum window size. Press TRACE and the arrow cursor keys to display the coordinate values of the data points.

```
|··· = SCATTERPLOT (2 VAR)
|   = XY LINE (2 VAR)
    = MOD. BOXPLOT (1 VAR)
    = HISTOGRAM (1 VAR)
```

Press 2nd [QUIT] to access the CHOOSE A FIT METHOD menu. Select **1:LIN REG** to see the graph of the linear function that best fits the data.
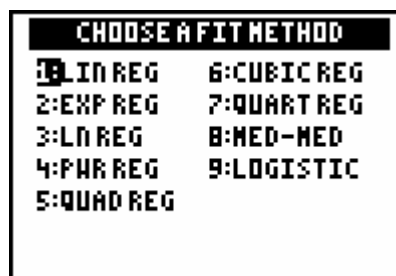
Press Y= to view the equation. Press 2nd [QUIT] until the EXIT tab appears. You can now exit the application and follow the steps above to use the Equation Solver.

```
CHOOSE A FIT METHOD
1:LIN REG      6:CUBIC REG
2:EXP REG      7:QUART REG
3:LN REG       8:MED-MED
4:PWR REG      9:LOGISTIC
5:QUAD REG
```