

TI Technology Guide for Is leisure time really shrinking?

TI-83 Plus and TI-84 Plus Families

Creating Lists of Data, Displaying the Graph, Using the Regression Capabilities of the Calculator, Finding the Intersection Between Graphs, and Finding the Maximum of a Graph

Creating Lists of Data

To enter the data from the Snapshot in the activity, press 2ND 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 and pressing C . If you see a list other than L1 through L6, press 2ND and select 5:SetUpEditor C and then follow the above instructions.

L1	L2	L3	1
-----	-----	-----	
L1(1) =			

Move the cursor to the first data position in L1 and enter the years from the USA TODAY Snapshot “Is leisure time really shrinking”. Move the cursor to the first data position in L2 and enter the corresponding median number of hours per week Americans say they spend on work. Move the cursor to the first data position in L3 and enter the corresponding median number of hours Americans say they spend on leisure per week.

L1	L2	L3	3
1973	40.6	26.2	
1980	46.9	19.2	
1987	48.8	16.6	
1996	50.7	19.5	
1997	50.8	19.5	
1998	49.9	19.4	
1999	50.2	19.8	
L3(7) = 19.8			

Move the cursor to the top of L4 and press 2ND DEL C . The numbers in L4 represent the difference between consecutive entries in L2 and L3.

L2	L3	L4	4
40.6	26.2	-----	
46.9	19.2		
48.8	16.6		
50.7	19.5		
50.8	19.5		
49.9	19.4		
50.2	19.8		
L4 = L2 - L3			

The numbers in L4 represent the difference between median hours at work per week and median hours spent on leisure per week.

L2	L3	L4	4
40.6	26.2	14.4	
46.9	19.2	27.7	
48.8	16.6	32.2	
50.7	19.5	31.2	
50.8	19.5	31.3	
49.9	19.4	30.5	
50.2	19.8	30.4	
L4(1) = 14.4			

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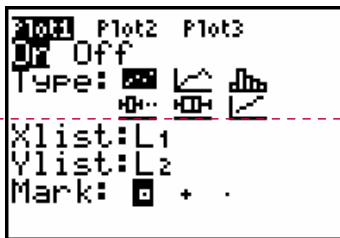
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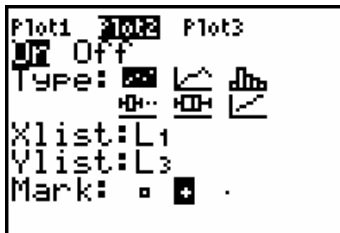
Displaying the Graph

Access the STAT PLOTS menu screen by pressing ψ o. Select (press $\underline{=}$ or the number 1) 1:Plot1 to get the screen shown. Make the changes needed, so that Plot1 has the same settings as shown at the right.

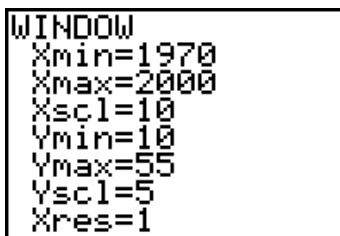


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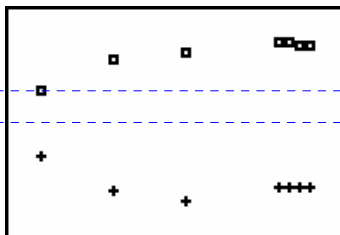
Move the cursor to Plot2 at the top of the screen and press $\underline{=}$. Repeat the procedure above for Plot2 with the settings shown at the right.



To insure that all the data points are visible, press π and enter values for the x-axis and y-axis that contain the range of values from both sets of data shown in the graphic (see suggested values at the right).

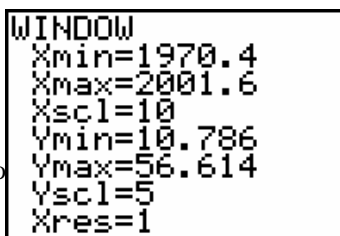


Press σ and clear any equations listed. Press σ to view both scatter plots. Years (L1) are on the horizontal axis, and the number of hours per week that Americans say they spend on work (L2) and the number of hours per week that Americans say they spend on leisure (L3) consumption are on the vertical axis. Press ρ and use the $\{$ or \sim keys to read the values of the data points. Use the $\}$ or \sim to move between the scatter plots.



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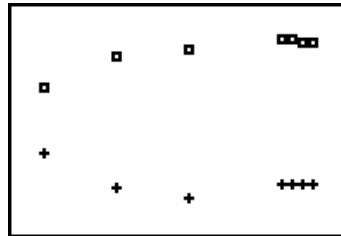
Another way to set the window for a scatter plot is to press $\theta \rightarrow$. This will select 9:ZoomStat which will



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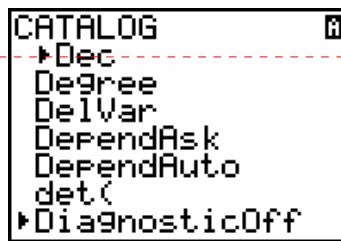
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automatically set the viewing window and display all the data points from both scatter plots.



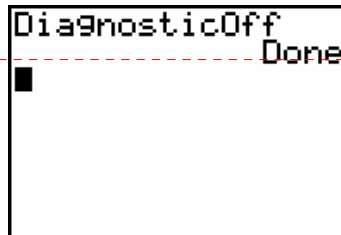
Using the Regression Capabilities of the Calculator

To turn off the diagnostic tools of r (correlation coefficient) and r^2 (coefficient of determination), press ψ ND then press \rightarrow until you locate DiagnosticOff.



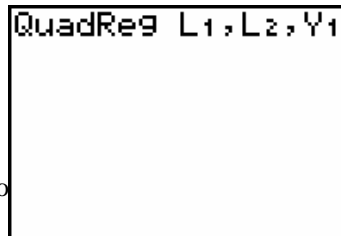
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Press \llcorner . If you want to activate the diagnostic tools of r and r^2 repeat the above procedure but select DiagnosticOn.



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To use the regression capabilities, press \sim to access the CALC menu. The regression models are 3 through C and the arguments for each regression



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model are the same. To use the quadratic regression model select 5:QuadReg from the STAT CALC menu and enter $\psi\delta'\psi\epsilon'$ $\sim\subseteq\subseteq$ to include all arguments shown in the screen shot. These commands will calculate the best fit

model for the scatter plot of L1 and L2 and then paste the model in the Y= register in Y1.

Press \subseteq to calculate the quadratic function that best models the data set.

```
QuadReg
y=ax2+bx+c
a=-.0215805616
b=86.07511991
c=-85778.0992
R2=.9837199368
```

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Repeat the above procedure to determine the quadratic model for the other scatter plot of L1 and L3 with the regression equation being put in Y2.

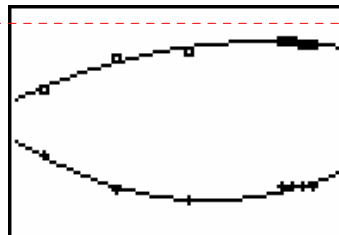
```
QuadReg L1,L3,Y2
```

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```
QuadReg
y=ax2+bx+c
a=.0372051594
b=-147.9909782
c=147182.5855
R2=.9641703193
```

Press σ . The regression lines and the scatter plots are displayed simultaneously.



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Press 2ND Y= to view the functions. 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 function determined by the regression capabilities is also showing on the graph. Pressing = 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.

```

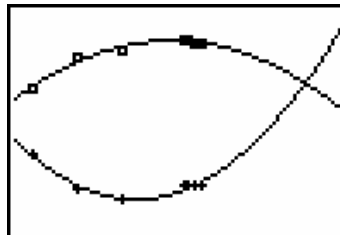
Plot1 Plot2 Plot3
\Y1=.0215805615
7602X^2+86.07511
9905494X+-85778.
099201486
\Y2=.03720515942
205X^2+-147.9909
7819404X+147182.
    
```

Press 2ND WINDOW and make the change shown in the screen shot at the right. The change is necessary so that the intersection of the two curves is in the graphing screen.

```

WINDOW
Xmin=1970.4
Xmax=2020
Xscl=10
Ymin=10.786
Ymax=56.614
Yscl=5
Xres=1
    
```

Press 2ND ZOOM to see both functions and scatter plots.



Finding the Intersection between Graphs

Press 2ND F5 and select 5:intersect. At the bottom of the screen the prompt appears identifying the curves that intersect. Use the up or down arrow keys to switch between the curves. Press = when prompted to identify the First curve.

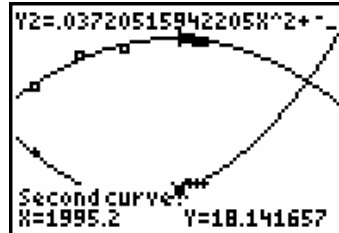
```

Y1=.02158056157602X^2+
86.07511X-85778.099201486
Y2=.03720515942205X^2-
147.9909X+7819404.147182
First curve?
X=1995.2 Y=50.583296
    
```

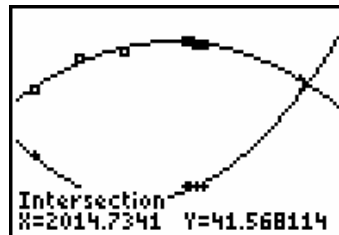
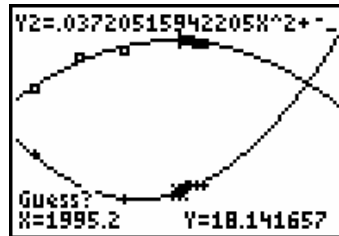
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Press $\underline{\text{2ND}}$ again when prompted to identify the Second curve. Notice that the cursor has jumped to the other curve and the equation has changed in the upper left-hand corner.

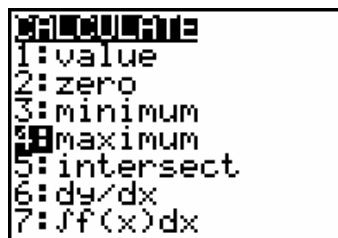


When prompted to Guess, use the right or left arrow keys to place the cursor near the point of intersection that you are trying to find, then press $\underline{\text{ENTER}}$. If there were more than two curves use the up or down arrow to move the cursor to the curve you want to use before pressing $\underline{\text{ENTER}}$. The coordinates of the intersection are displayed at the bottom of the screen



Finding the Maximum of a Graph

Press $\underline{\text{2ND}}$ / and choose 4:maximum. If there are multiple graphs use the arrow keys(\leftarrow) so that the cursor is on the model where the maximum is located.

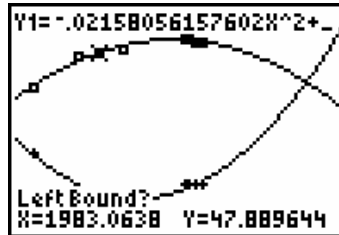


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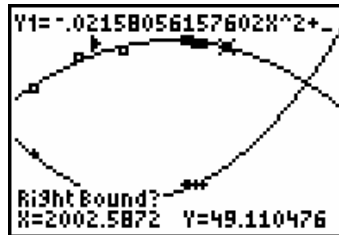
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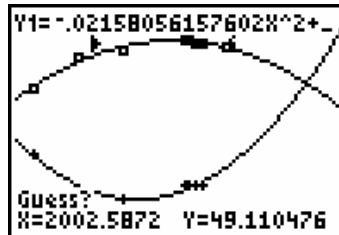
Use the arrow keys(←) to move the cursor so that it is to the left of the maximum value of the graph and press \square .



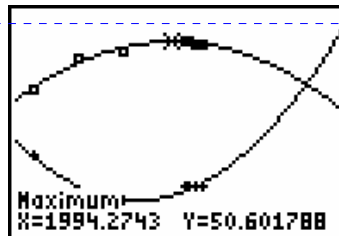
Continue to pressing ← until the cursor is on the right side of the maximum value of the graph and press \square .



When prompted to Guess, use the right or left arrow keys to place the cursor near the point representing the maximum that you are trying to find.



Press \square and the maximum point will be shown at the bottom of the screen.



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1. You probably noticed under "displaying the graph" that I deleted several sentences about turning the plots on and off. When I select Plot1, my calculator has plot1 and OFF highlighted. The cursor is blinking on ON, so I just press ENTER. Since that is different than what your calculator is doing, I just figured that the students should be able to match your screen given no further direction.¶
2. I am assuming that I don't have to review the TE and SE activities that go along with this TG. If more questions are needed, I would suggest to ask the students to do more interpreting. For example: Are these good models to use for predictions? Why or why not? Why do you think the maximum work hours per week occurred in 1994? How might the data be skewed depending upon how the data was collected and what kinds of careers were represented?