TI Technology Guide for Hurricane Categories

TI-83 Plus and TI-84 Plus Families

Creating Lists of Data, Displaying the Graph, Using the Regression Capabilities of the Calculator, and Predicting Using the Regression Model

Creating Lists of Data

1. To enter the data from the Snapshot in the activity, 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 and pressing ⎡CLEAR⎤⎡ENTER⎤. If you see a list other than L1 through L6, press and select ⎡STAT⎤ 5:SetUpEditor ⎡ENTER⎤ and then follow the above instructions.

2. Move the cursor to the first data position in L1. Enter data from the USA TODAY Infographic, "Hurricane damage….", that represent the hurricane categories shown. Move the cursor to the first data position in L2 and enter the corresponding wind speeds for each storm category.

3. A formula will be used to calculate the pounds per square foot given the wind speed.   Move the cursor to the heading of L3, making sure that L3 is highlighted. To enter the formula that will calculate the pounds per square foot, press ⎡2nd⎤ ⎡L2⎤⎡x^2⎤⎡×⎤0.004⎡ENTER⎤.

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Displaying the Graph

1. Access the STAT PLOTS menu screen by pressing [2nd] [Y=].   Select (press [ENTER] or the number 1) 1:Plot1 to get the screen shown. Notice that Plot1 and On are highlighted To turn on or off any plot, place the cursor over the name, press [ENTER], then select either On or Off, and press [ENTER] again. This process acts like a toggle switch to turn the plots on and off the graphing display. Plot1 should have the same settings as shown at the right.
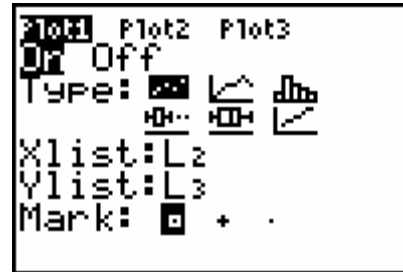
2. To insure that all the data points are visible, press [WINDOW] and enter values for the x-axis and y-axis that contain the range of values for the set of data shown in the graphic (see suggested values at the right).
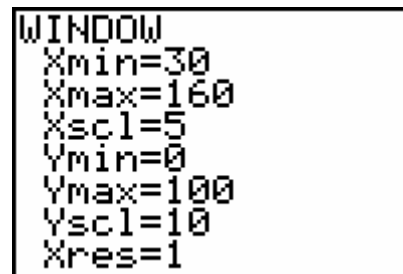
3. Press [Y=] and clear all equations listed. Press [GRAPH] to view the scatter plot. Wind speeds (L2) are on the horizontal axis, and pounds per square foot (L3) are on the vertical axis. Press [TRACE] and use the [◄] or [►] keys to read the values of the data points listed at the bottom of the screen.
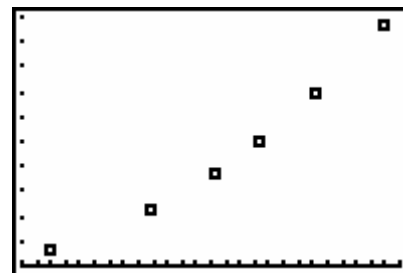
4. Another way to set the window for a scatter plot is to press [ZOOM] [9]. This will select 9:ZoomStat which will automatically set the viewing window and display all the data points from the scatter plot.
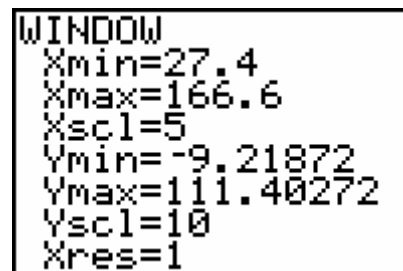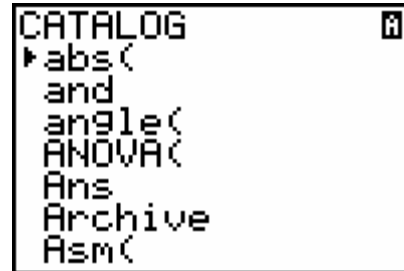
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Activating r and r^2
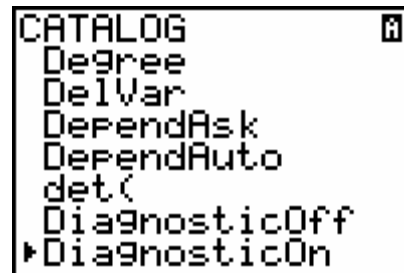1. To activate the values of r (correlation coefficient) and r^2 (coefficient of determination) press $\boxed{\text{2nd}}$$\boxed{\text{CATALOG}}$ $\boxed{\text{ALPHA}}$D and use the $\boxed{\blacktriangledown}$ to find DiagnosticOn and press $\boxed{\text{ENTER}}$$\boxed{\text{ENTER}}$.

```
CATALOG          ▯
▶abs(
 and
 angle(
 ANOVA(
 Ans
 Archive
 Asm(
```
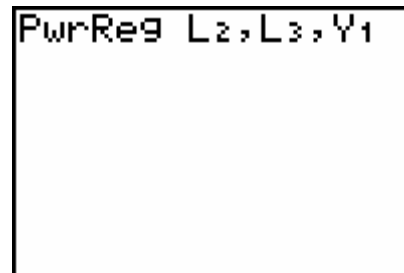
2. To deactivate the values of r and r^2 repeat the process from the step above but choose DiagnosticOff.

```
CATALOG          ▯
 Degree
 DelVar
 DependAsk
 DependAuto
 det(
 DiagnosticOff
▶DiagnosticOn
```
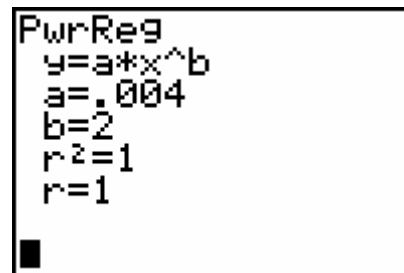
Regression Capabilities of the Calculator

1. To use the regression capabilities, press $\boxed{\text{STAT}}$$\boxed{\blacktriangleright}$to access the CALC menu. Select **A:PwrReg** and enter $\boxed{\text{L2}}$$\boxed{,}$ $\boxed{\text{L3}}$$\boxed{,}$Y1 as shown at the right.

```
PwrReg L₂,L₃,Y₁
```

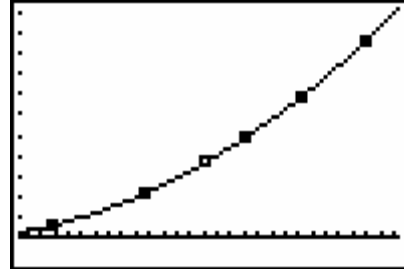2. Press $\boxed{\text{ENTER}}$to calculate the power model and the values for r and r^2.

```
PwrReg
 y=a*x^b
 a=.004
 b=2
 r²=1
 r=1

 ■
```

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3. Press GRAPH. The power model and the scatter plot are displayed.

4. Press Y= to view the function. Notice that Plot 1 is highlighted, which indicates that the data points for L2 and L3 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 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.

Predicting Using the Regression Model

1. Press 2nd[QUIT]CLEAR to return to the home screen. Press VARS ▸ 1 1 (1 0 0) ENTER to use the regression model to predict the pounds per square foot for a wind speed of 100 miles per hour.

2. The value means that with a wind speed of 100 mph the expected pounds per square foot is 40.

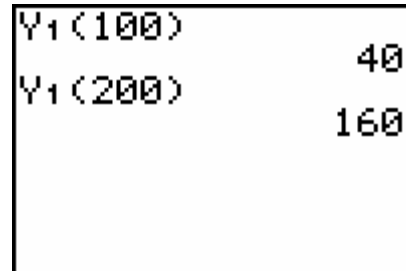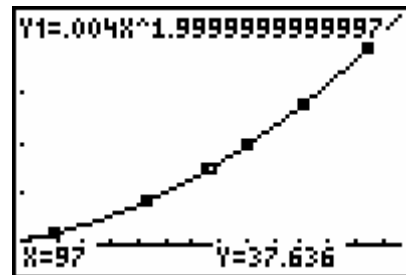# TI Technology Guide for Hurricane Categories

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3. Repeat the process from Step 6 for a wind speed of 200 mph. Press [2nd][ENTRY] to recall the last expression or instruction on the home screen. Edit the wind speed to determine the pounds per square foot for a wind speed of 200.

```
Y₁(100)
                    40
Y₁(200)
                   160
```

4. Press [GRAPH][TRACE] to see the coordinates. Press [▲] or [▼] to toggle between the scatter plot data and the model.

```
Y1=.004X^1.9999999999997
X=97            Y=37.636
```

5. To predict the pounds per square foot for a wind speed of 100 mph, move the blinking cursor so that it is on the model. Entering the wind speed will automatically display it at the bottom of the screen.
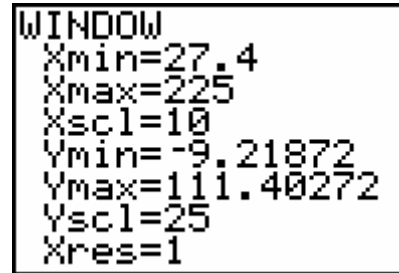
```
Y1=.004X^1.9999999999997
X=100█
```
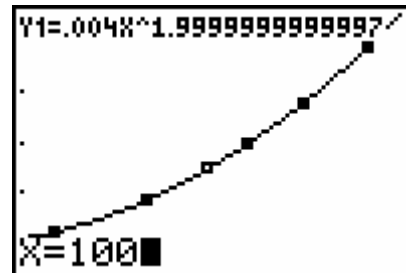
6. Press [ENTER] and the corresponding pounds per square foot for a wind speed of 100 mph will be displayed at the bottom of the screen.

```
Y1=.004X^1.9999999999997
X=100           Y=40
```
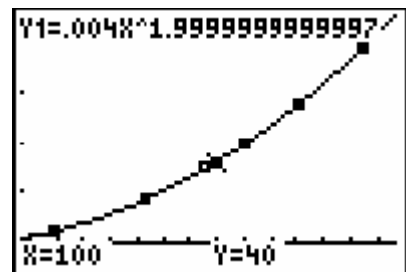
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7. To repeat this process for the wind speed of 200 mph you will have to change the window setting. When using this procedure the values for x (only independent values can be entered using this method) are linked to the window settings for Xmin and Xmax. In this case press WINDOW and change the Xmax to a number greater than 200. The screen shot shows one possible value.

```
WINDOW
 Xmin=27.4
 Xmax=225
 Xscl=10
 Ymin=-9.21872
 Ymax=111.40272
 Yscl=25
 Xres=1
```

8. Press GRAPH and repeat the above procedure (Steps 4-6) to determine the pound per square foot for a wind speed of 200.

```
Y1=.004X^1.9999999999997
```
```
X=200            Y=160
```
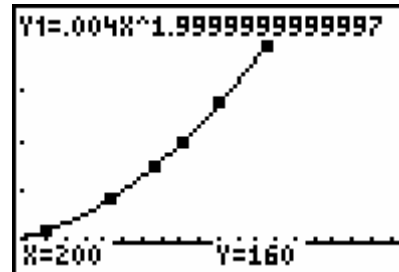
9. Another way to view the corresponding data is to use the table view. To access this feature, press 2nd [TBLSET]. The TABLE SETUP screen will display, a sample is shown. TblStart indicates the lower x (independent) value for the window setting and ΔTbl indicates that the x values will increase or decrease by that value.

```
TABLE SETUP
 TblStart=0
 △Tbl=1
Indpnt: Auto  Ask
Depend: Auto  Ask
```

10. Make the changes to the TABLE SETUP that you see at the right.

```
TABLE SETUP
 TblStart=100
 △Tbl=100
Indpnt: Auto  Ask
Depend: Auto  Ask
```

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11. Press 2nd TABLE to show the table with values for the wind speed and corresponding expected pounds per square foot. Use the down or up arrow keys to scroll the table.

X	Y₁	
100	40	
200	160	
300	360	
400	640	
500	1000	
600	1440	
700	1960	

X=100