

CALCULATORS: Casio: *ClassPad 300* • *ClassPad 300 Plus* • *ClassPad Manager*
 TI: *TI-89*, *TI-89 Titanium* • *Voyage 200*

The Casio ClassPad 300


t	$A(t)$	t	$A(t)$
1950	23.0	1975	24.7
1955	23.8	1980	25.2
1960	24.4	1985	25.5
1965	24.5	1990	25.9
1970	24.2	1995	26.3

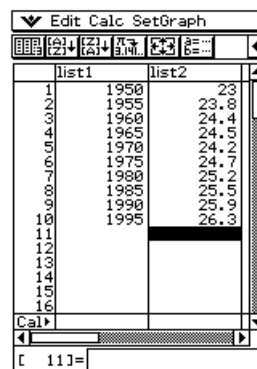
The table shows how the average age of the first marriage of Japanese women varied in the last half of the 20th century.

- Use a graphing calculator or computer to model these data with a fourth degree polynomial.
- Use part (a) to find a model for $A'(t)$.
- Estimate the rate of change of marriage age for women in 1990.
- Graph the data points and the models for A and A' .

Here's how you use the ClassPad 300 to solve this problem:

Enter and Plot Data

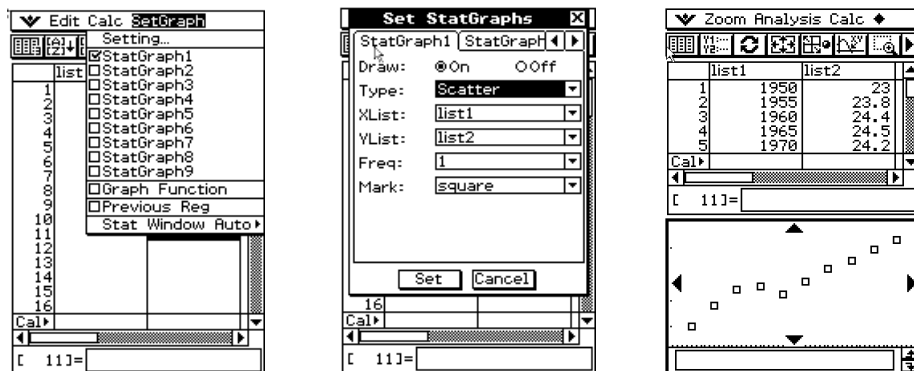
- On the Silk Screen Menu Bar tap **MENU**, then tap the **Statistics** icon.
- Enter the data:
 - If necessary, clear the lists by tapping **Edit/Clear All**.
 - To create a list with only two columns, tap **►** at the right end of the toolbar, then continuously tap  until 2 columns appear.
 - Enter the data.
- Create a scatter plot of the data:
 - On the Menu Bar, tap **SetGraph**.
 - Select **StatGraph1** and deselect the other **StatGraphs**.
 - Tap **Setting** at the top of the of the **SetGraph** menu.
 - Type:** Scatter
 - XList:** list1
 - YList:** list2
 - Freq:** 1
 - Mark:** square



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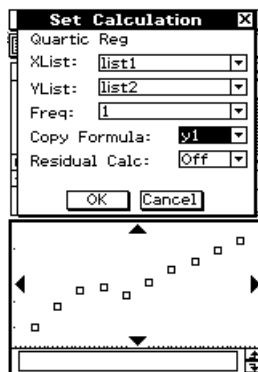
- Tap **Set**.
- At the right of the Toolbar, tap . Then tap at the left of the toolbar.



Model the Data with a Fourth Degree Polynomial

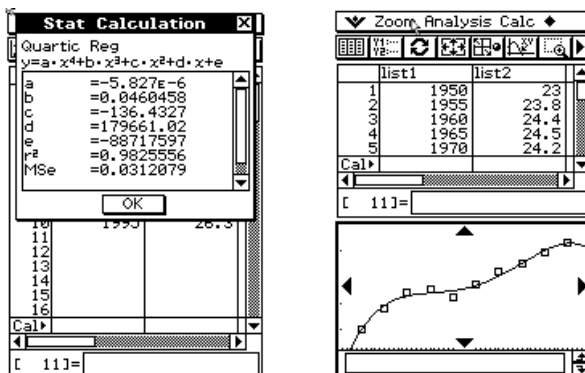
1. On the Menu Bar tap **Calc / Quartic Reg**.

Set **XList:** list1
YList: list2
Freq: 1
Copy Formula: y1
Residual Calc: Off



2. Tap **OK** to display the coefficients of the quartic equation that models the data.

3. Tap **OK** and then tap to graph the data and the quartic equation.



Modeling




(continued)

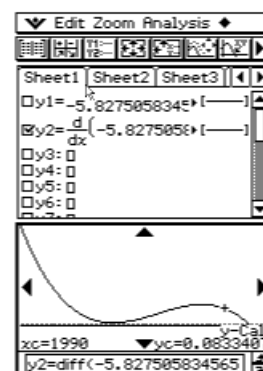
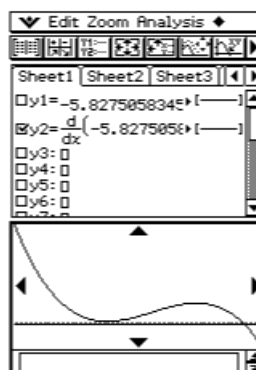
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The Casio ClassPad 300

Graph $A'(x)$ and estimate Rate of Change in 1990.

1. Graph $A'(x)$:

- Tap  in the Toolbar and press **Keyboard**.
- On the Keyboard, tap **2D**. If  is displayed between the 2D menu and the keypad, tap it to display the second half of the 2D menu.
- Tap the **box to the right** of y_2 at the top of the screen.
- Tap the **derivative symbol** – bottom row, middle.
- Tap x .
- Highlight and drag the definition of y_1 to the box in y_2 .
- Tap the **box to the left** of y_1 to deselect it and tap the box next to y_2 .
- Tap , then tap **Zoom / Auto**.



2. Estimate the Rate of Change:

- Tap **Analysis/G-Solve/y-Cal**.
- Enter **1990** and tap **OK**.

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The TI-89

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- Graph the data points and the models for A and A' .

Here's how you use the TI-89 to solve this problem:

Enter and Plot Data

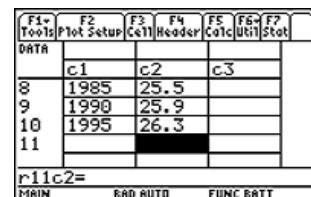
1. Start the Data/Matrix Editor:

- Press **APPS** and select the **Data/Matrix Editor**.
- Press **3** to start a new data set.
- Press **▼►** and select the folder in which your data is to be stored.
- Press **▼** and enter a name for your data.
- Press **ENTER** twice to display the Data editor.



2. Enter the data:

- Enter the years in **c1**. Press **ENTER** after each entry.
- Press **►2nd▲** to move to the top of the second column.
- Enter the data for the average age. Press **ENTER** after each entry.



3. Create a scatter plot of the data:

- Press **F2** and highlight the plot in which you want to create the scatter plot.
- Press **F1** to set-up the scatter plot.
- Press **▼** two times to accept the default scatter plot style.



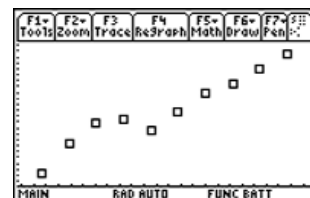
Modeling

(continued)

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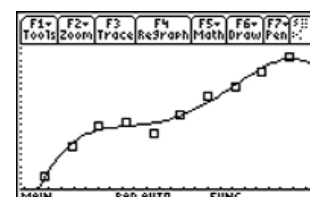
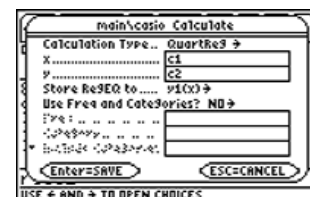
The TI-89

- Enter **c1** to plot the year on the x -axis.) **alpha 1**
- Press **▼** and enter **c2** to plot the average age on the y -axis. **alpha**) **2**
- Press **ENTER** two times to save your settings.
- Press **◆ F1** to enter the Y= editor and uncheck any functions or stat plots that you don't want to graph. (Pressing **F4** toggles a function or stat plot between being checked and unchecked.)
- Press **F2 9** to get ZoomData to graph the scatter plot.



Model the Data with a Fourth Degree Polynomial

1. Reenter the Data/Matrix Editor. Press **APPS**, select the **Data/Matrix Editor**, and then press **1**.
2. Tell the calculator to find the Quartic regression for your data:
 - Press **F5** to enter the Calc menu.
 - Press **▶** to display the Calculation Type menu and highlight **QuartReg**.
 - Press **ENTER** to select QuartReg.
 - Tell the calculator to graph the year on the x -axis by entering **c1**.) **alpha 1**
 - Press **▼** and enter **c2** to graph the average age on the y -axis.) **alpha 2**
 - Press **▼▶** to display the functions in which you can store the quadratic regression formula, highlight the function of your choice, and then press **ENTER**.
 - Press **ENTER** to save your settings.
 - Press **ENTER** again to get rid of the STAT VARS display.
 - Press **◆ F3** to graph the Quartic regression.



Modeling

(continued)

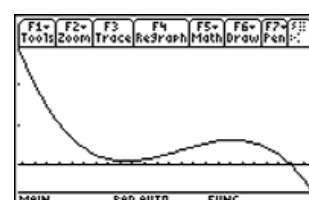
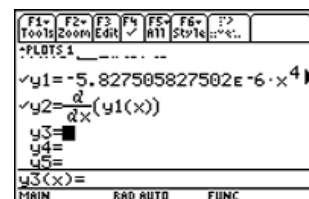
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The TI-89

Graph $A'(x)$ and estimate Rate of Change in 1990.

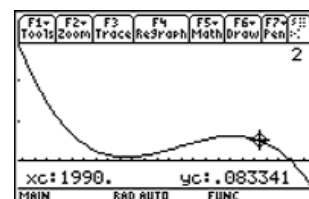
1. Graph $A'(x)$:

- Press **◆ F1** to enter the Y= editor.
- Move the cursor to the function in which you want to define the derivative and press **ENTER**.
- Press **2nd 8** to enter the derivative command.
- Enter the function in which you stored the regression formula. For example, if the regression formula is stored in y1, enter y1(x).
Y 1 (X 1
- Press **, X** to tell the calculator that the derivative is with respect to x.
- Press **F2** to complete the definition of the derivative.
- Press **ENTER** to define the function.
- Uncheck all functions except the one containing the derivative.
- Press **F2** and select **ZoomFit** to graph the derivative. It will take awhile for the graph to appear.



2. Estimate the Rate of Change:

- Press **F5 1** to select the Value command from the Graph Math menu.
- Enter 1990 and press **ENTER**.



THE CASIO ADVANTAGE

- **Ease of Use:** When you enter the Statistics window on the *ClassPad 300*, the list editor is onscreen waiting for input.
- After viewing the graph of your data on the *ClassPad 300*, everything you need to find regression models is right there on the screen. On the TI-89, you must re-enter the Data Matrix editor in order to find regression models.