

Statistics applet

About the Statistics applet

The Statistics applet can store up to ten separate data sets at one time. It can do one-variable or two-variable statistical analysis of one or more sets of data.

The Statistics applet starts with the Numeric view which is used to enter data. The Symbolic view is used to specify which columns contain data and which column contains frequencies.

You can also compute statistics values in HOME and recall the values of specific statistics variables.

The values computed in the Statistics applet are saved in variables, and many of these variables are listed by the STATS function in Numeric view.

Getting started with the Statistics applet

The following example asks you to enter and analyze the advertising and sales data (in table below), compute statistics, fit a curve to the data, and predict the effect of more advertising on sales.

| Advertising minutes (independent, x) | Resulting Sales (\$) (dependent, y) |
|--|---|
| 2 | 1400 |
| 1 | 920 |
| 3 | 1100 |
| 5 | 2265 |
| 5 | 2890 |
| 4 | 2200 |

Open the Statistics applet

1. Open the Statistics applet. *Note: Clear existing data.*

APLET

Select Statistics

RESET

START

The Statistics applet starts in the Numerical view.

| n | C1 | C2 | C3 | C4 |
|---|----|----|----|----|
| 1 | | | | |

EDIT INS SORT BIG IVAR=STAT

1VAR/2VAR
menu key label



At any time the Statistics aplet is configured for only one of two types of statistical explorations: 1-variable or 2-variable. The 5th menu key label in the Numeric view toggles between these two options and shows the current option. With **1VAR** active, the Symbolic view shows 5 possible **1VAR** explorations named H1 - H5; with **2VAR** active, the Symbolic view shows S1- S5. Select **2VAR** before continuing.

Enter data

2. Enter the data into the columns. *Note: Ensure 2VAR is selected (press 1VAR).*

2 [ENTER] 1 [ENTER]

3 ENTER 5 ENTER

5 4

▶ *to move to the next*

column

1400 [ENTER] 920 [ENTER]

1100 **ENTER** 2265 **ENTER**

2890 [ENTER] 2200 [ENTER]

| n | C1 | C2 | C3 | C4 |
|---|-------|-------|----|----|
| 2 | 1 | 920 | | |
| 3 | 3 | 1100 | | |
| 4 | 5 | 2265 | | |
| 5 | 5 | 2890 | | |
| 6 | 4 | 2200 | | |
| 7 | | | | |

| | | | | | |
|------|-----|------|-----|------|------|
| EDIT | INS | SOFT | BIG | PARA | STAT |
|------|-----|------|-----|------|------|

Define data columns

- Define the fit. Ensure **S1FIT** is set to **Linear** in the Symbolic setup view.

SHIFT *SETUP-SYMB*

▼ CHOOS

Select Linear

OK

20 STATISTICS SYMBOLIC SETUP
 ANGLE MEASURE: Radians
 S1FIT: Linear S2FIT: Linear
 S3FIT: Linear S4FIT: Linear
 S5FIT: Linear
 CHOOSE STATISTICS MODEL TYPE
 CHOOSE

- Define data columns in the Symbolic view. *Note: if necessary, clear the previous definition of $S1$. The default Fit is Linear ($mx+b$).*

Explore statistics

[SYMB]

```

EQ STATISTICS SYMBOLIC VIEW
S1: C1 C2
Fit1: m*X+b
S2:
Fit2: m*X+b
ENTER INDEPENDENT
EDIT CHK C SHOW EVAL

```

- Find the mean advertising time (MEANX) and the mean sales (MEANY) for the data fitting a straight line. The CORR value indicates how well the linear model fits the data.

[NUM] STATS

MEANX is about 3.3 minutes and MEANY is about \$1796.

```

2-VAR S1
MEANX 3.333333
X 20
X2 80
MEANY 1795.833
Y 10775
Y2 22338725
3.333333333333
OK

```

- Scroll down to display the value for the correlation coefficient (CORR) for the data fitting a straight line.

▼ 9 times

OK

The value is 0.8995 to four significant digits.

```

2-VAR S1
Y2 22338725
X2 80
SCOV 1135.667
PCOV 946.3889
CORR .8995324
RELERR .0255324
.899530938561
OK

```

Setup plot

- Change the points marker on the plot.

[SHIFT] SETUP-PLOT

▶ 7 [ENTER]

(-) 100 [ENTER]

4000 [ENTER]

This makes the mark for S1 more visible.

```

EQ STATISTICS PLOT SETUP
XRMG: 0 7
YRMG: -100 4000
S1MARK: + S2MARK: + S3MARK: +
S4MARK: :: S5MARK: x
ENTER MINIMUM HORIZONTAL VALUE
EDIT PAGE 1

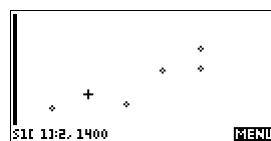
```

Plot the graph

- Plot the graph.

[PLOT]

(At this time you could return to the Plot setup view and adjust the settings if you want the axes visible.)



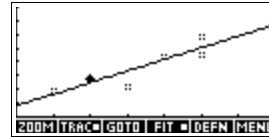
Find the regression curve

Display the equation for best linear fit

9. Find the regression curve (a curve to fit the data points).

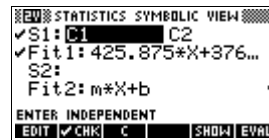
MENU FIT

This draws the regression line for the best linear fit.



10. Return to the Symbolic view.

SYMB

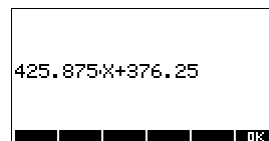


11. Display the equation for the best linear fit.

▼ to move to the FIT1 field

SHOW

The full FIT1 expression is shown. The slope (m) is 425.875. The y-intercept (b) is about 376.25.



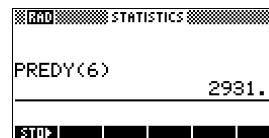
12. Find the predicted sales figure if advertising were to go up to 6 minutes.

OK HOME

MATH S (to highlight Stat-Two)

► ▼ (to highlight PREDY)

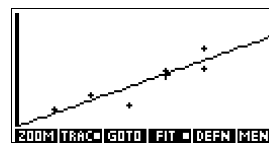
OK 6 ENTER



13. Return to the Plot view to display the line of best fit at 6 minutes.

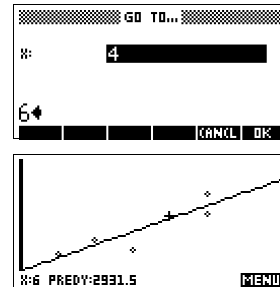
PLOT

▼ to move to the graph of the linear fit.



14. Jump to the indicated point on the fit.

MENU GOTO
6
OK



Entering/editing statistical data

The Numeric view (**NUM**) is used to enter data into the Statistics applet. Each column represents a variable named C0 through C9. After entering the data, you must define the data set in the Symbolic view (**SYMB**). See “Defining data sets” on page 8-103 for further information.



A data column must have at least four data points to provide valid two-variable statistics, or two data points for one-variable statistics.

You can also store statistical data values by copying lists from HOME into Statistics data columns. For example, in HOME, **L1 STO► C1** stores a copy of the list L1 into the data-column variable C1.

Statistics applet's NUM view keys

| Key | Meaning |
|-------------|--|
| EDIT | Copies the highlighted item into the edit line. |
| INS | Inserts a zero value above the highlighted cell. |
| SORT | Sorts the specified <i>independent</i> data column in ascending or descending order, and sorts a specified dependent (or frequency) data column along with it. |
| BIG | Switches between larger and smaller type sizes. |

| Key | Meaning (Continued) |
|----------------------------------|--|
| 1VAR... 2VAR... | A toggle switch to set one-variable or two-variable statistics. This setting affects the statistical calculations and plots. The label indicates which setting is current. |
| STATS | Computes descriptive statistics for each data set specified in Symbolic view. |
| | Deletes the currently highlighted value. |
| CLEAR | Clears the current column <i>or</i> all columns of data. |
| cursor key | Moves to the first or last row or column. |

Example

You are measuring the height of students in a classroom to find the mean height. The first five students have the following measurements 160cm, 165cm, 170cm, 175cm, 180cm.

1. Open the Statistics aplet.

Select
Statistics
RESET
START

| | | |
|---------------------------------|-------|-----|
| APLET LIBRARY | | EEK |
| Statistics | .07KB | |
| Function | 0KB | |
| Inferential S... | .54KB | |
| Parametric | 0KB | |
| Polar | 0KB | |
| SAVE RESET SORT SEND RECV START | | |

2. Enter the measurement data.


160
165
170
175
180

| n | C1 | C2 | C3 | C4 |
|------------------------------|-----|----|----|----|
| 1 | 160 | | | |
| 2 | 165 | | | |
| 3 | 170 | | | |
| 4 | 175 | | | |
| 5 | 180 | | | |
| EDIT INS SORT BIG 1VAR STATS | | | | |

3. Find the mean and standard deviation of the sample.


Ensure the **1VAR/2VAR** menu key toggled to **1VAR**. Press **STATS** to see the statistics calculated from the sample data in C1.

| 1-VAR | H1 | | |
|-------|----------|--|--|
| NΣ | 5 | | |
| TOTΣ | 850 | | |
| MEANΣ | 170 | | |
| PVARΣ | 50 | | |
| SVARΣ | 62.5 | | |
| PSDEV | 7.071068 | | |
| 5 | | | |
| OK | | | |

Use the  key to see the second page of these statistics.

It is important to note that the title for the column of statistics is H1. There are 5 data set definitions available, H1-H5. If data is entered in C1, H1 is automatically set to use C1 for data, and the frequency of each data point is set to 1.

| 1-VAR | H1 | | |
|--------|----------|--|----|
| SSDEV | 7.905644 | | |
| MIN2 | 160 | | |
| Q1 | 162.5 | | |
| MEDIAN | 170 | | |
| Q3 | 172.5 | | |
| MAX2 | 180 | | |
| | 180 | | |
| | | | OK |

4. Press  key to see the data set definitions.

| REV STATISTICS SYMBOLIC VIEW | |
|------------------------------|------------------|
| ✓H1: | C1 |
| H2: | 1 |
| H3: | 1 |
| H4: | 1 |
| ENTER SAMPLE | |
| EDIT | ✓CHK C SHOW EVAL |

To continue our previous example, suppose that the heights of the rest of the students in the class are measured, but each one is rounded to the nearest of the five values first recorded. Instead of entering all the new data in C1, we shall simply provide another column, C2, that holds the frequencies of our five data points in C1.

| Height (cm) | Frequency |
|-------------|-----------|
| 160 | 5 |
| 165 | 3 |
| 170 | 8 |
| 175 | 2 |
| 180 | 1 |

5. Move the highlight bar into the right column of the H1 definition and replace the frequency value of 1 with the name C2. Note: the menu key for the letter C.

| REV STATISTICS SYMBOLIC VIEW | |
|------------------------------|------------------|
| ✓H1: | C1 C2 |
| H2: | 1 |
| H3: | 1 |
| H4: | 1 |
| ENTER SAMPLE | |
| EDIT | ✓CHK C SHOW EVAL |

6. Return to the Numeric View and enter the frequencies as shown in the table below.

It is then decided to measure in 5cm ranges. You then end up with the following data:

- Enter the frequency data.

► 5
 3
 8
 2
 1

| n | C1 | C2 | C3 | C4 |
|---|-----|----|----|----|
| 1 | 160 | 5 | | |
| 2 | 165 | | | |
| 3 | 170 | | | |
| 4 | 175 | | | |
| 5 | 180 | | | |
| | | | | |
| | | | | |

EDIT INS SORT BIG 1VAR=STAT

- Display the computed statistics. You can scroll down to the mean.

STATS

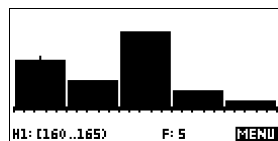
From the graph the mean height is 167.63cm.

| 1-VAR | H1 | | |
|-------|---------------|--|----|
| NΣ | 19 | | |
| TOTΣ | 3185 | | |
| MEANΣ | 167.6316 | | |
| VARΣ | 32.54848 | | |
| SDΣ | 5.70979 | | |
| PSDEV | 5.70979 | | |
| | 167.631578947 | | |
| | | | OK |

- Setup a histogram plot for the data. **OK** **PLOT**

| STATISTICS PLOT SETUP | | | |
|-------------------------------|------|---------|-----|
| STATPLOT: | Hist | HWIDTH: | 5 |
| XRNG: | 160 | | 185 |
| YRNG: | -2 | | 10 |
| HRNG: | 160 | | 185 |
| ENTER MAXIMUM HISTOGRAM VALUE | | | |
| EDIT | | PAGE | |

- Plot a histogram of the data.



Angle Setting

You can ignore the angle measurement mode *unless* your Fit definition (in Symbolic view) involves a trigonometric function. Then you should specify in the mode screen whether the trigonometric units are assumed to be in degrees, radians, or grads.

Save data

The data that you enter is automatically saved. When you are done entering data values, you can press a key for another Statistics view (like), or you can switch to another aplet or HOME.

Edit a data set

In the Numeric view of the Statistics aplet, highlight the data value to change. Type a new value and press , or press **EDIT** to copy the value to the edit line for modification.

Delete data

- To delete a single data item, highlight it and press **DEL**. The values below the deleted cell will scroll up one row.
- To delete a column of data, highlight an entry in that column and press **SHIFT** **CLEAR**. Select the column name.
- To delete all columns of data, press **SHIFT** **CLEAR**. Select **All columns**.

Insert data

Highlight the entry *following* the point of insertion. Press **INS**, then enter a number. It will write over the zero that was inserted.

Sort data values

1. In Numeric view, highlight in the column you want to sort, and press **SORT**.
2. Specify the SORT ORDER option. You can choose either **Ascending** or **Descending**.
3. Specify the **INDEPENDENT** and **DEPENDENT** data columns. Sorting is by the *independent* column. For instance, if Age is C1 and Income is C2 and you want to sort by Income, then you make C2 the independent column for the sorting and C1 the dependent column.
 - To sort just one column, choose **None** for the dependent column.
 - For one-variable statistics with two data columns, specify the frequency column as the dependent column.
4. Press **OK**.

Defining data sets

After entering the data, you must define the data set in the Symbolic view (**SYMB**). Data sets are named H1 through H5 for one-variable statistics, or S1 through S5 for two-variable statistics. The **1VAR/2VAR** menu key at the bottom of the Numeric view input form determines whether the calculator treats the data as one-variable or two-variable statistics. You can then compute their statistical values. You compute descriptive statistics by pressing the **STATS** menu key in the Numeric view. See “Computing statistics (1VAR and 2VAR)” on page 8-106 for further information.

For two-variable (2VAR) statistics, you must first define the regression model.

1. Press **[NUM]** to open the Numeric view. Verify that the appropriate **1VAR** or **2VAR** menu label is on.
2. Press **[SYMB]** to open the Symbolic view. Verify that the data set (H or S variable) is defined and that the data set(s) you want to analyze are checkmarked. Press **✓CHK** to check or uncheck data sets. Press **[NUM]** to return to the numeric view.

Defining a regression model (2VAR)

The Symbolic view includes an expression (Fit1 through Fit5) that defines the regression model, or “fit”, to use for the regression analysis of each two-variable data set.

There are three ways to select a regression model:

- Accept the default option to fit the data to a straight line.
- Select one of the available Fit options in Symbolic Setup.
- Enter your own mathematical expression in Symbolic view. This expression will be plotted, *but it will not be fitted to the data points.*

To choose the fit

1. In Numeric view, make sure **2VAR** is set.
2. Press **[SHIFT]SETUP-SYMB** to display the Symbolic Setup view. Highlight the Fit number (**S1FIT** **S5FIT**) you want to define.
3. Press **CHOOS** and select from the following list. Press **OK** when done. The regression formula for the fit is displayed in Symbolic view.

Fit models

| Fit model | Meaning |
|-----------|--|
| Linear | (Default.) Fits the data to a straight line, $y = mx + b$. Uses a least-squares fit. $m * X + b$ |

| Fit model | Meaning (Continued) |
|--------------|---|
| Logarithmic | Fits to a logarithmic curve, $y = m \ln x + b$. $m * \text{LN}(X) + b$ |
| Exponential | Fits to an exponential curve, $y = be^{mx}$. $\text{EXP}(m * X) * b$ |
| Power | Fits to a power curve, $y = bx^m$. $X^m * b$ |
| Quadratic | Fits to a quadratic curve, $y = ax^2 + bx + c$. Needs at least three points. $a * X^2 + b * X + c$ |
| Cubic | Fits to a cubic curve, $y = ax^3 + bx^2 + cx + d$. Needs at least four points. $a * X^3 + b * X^2 + c * X + d$ |
| Logistic | Fits to a logistic curve, $y = \frac{L}{1 + ae^{(-bx)}}$ where L is the saturation value for growth. You can store a positive real value in L , or—if $L=0$ —let L be computed automatically. $L / (1 + a * \text{EXP}(-b * X))$ |
| User Defined | Define your own expression (in Symbolic view.) |

To define your own fit

1. In Numeric view, make sure **2VAR** is set.
2. Display the Symbolic view. Highlight the Fit expression (Fit1, etc.) for the desired data set. Type in an expression and press **[ENTER]**. The independent variable must be X , and the expression must not contain any unknown variables. Example: $1.5 * \cos(X) + 0.3 * \sin(X)$.

This automatically changes the Fit type (S1FIT, etc.) in the Symbolic Setup to “User Defined.”

Computing statistics (1VAR and 2VAR)

After entering your data values (in Numeric view) and defining the data set(s) (in Symbolic view), you can compute statistics for the checkmarked data set(s).

To compute statistics

- 1. Press **NUM** to open the Numeric view. Verify that the appropriate **1VAR** or **2VAR** menu label is on.
- 2. Press **SYMB** to open the Symbolic view. Verify that the data set (H or S variable) is defined and that the data set(s) you want to analyze are checkmarked. Press **CHK** to check or uncheck data sets. Press **NUM** to return to the numeric view.
- 3. Press **STATS**. You will see a list of computed statistics corresponding to the data set(s) and statistics type (**1VAR** or **2VAR**) you specified. Each column of values is computed from a separate, checkmarked data set (H or S variable).

| | | | |
|-------|----------|--|----|
| 1-VAR | H1 | | |
| NΣ | 13300 | | |
| TOTΣ | 82120 | | |
| MEANΣ | 6.174436 | | |
| VARΣ | 5.842768 | | |
| SDDEV | 2.418216 | | |
| 13300 | | | |
| | | | OK |

| | | | |
|-------------------|----------|--|----|
| 2-VAR | S1 | | |
| MEANΣ | 5.166667 | | |
| ΣX | 81 | | |
| ΣX ² | 205 | | |
| MEAN _Y | 2216.667 | | |
| ΣY | 13300 | | |
| ΣY ² | 34304350 | | |
| 5.166666666667 | | | |
| | | | OK |

- 4. When done, press **OK** to return to the Numeric view.
- The computed statistics are defined in the following tables. Their values are also stored in variables of the same names. You can access a variable by entering its name in HOME, or by recalling it from the **VARS** menu (Select **APLET**, highlight Stat-One or Stat-Two, then select the name of the variable). If using the **VARS** menu in HOME, the Statistics aplet must be the current (last used) aplet.

One-variable computed STATS

| 1VAR Statistic | Definition |
|----------------|--|
| NΣ | Number of data points. |
| TOTΣ | Sum of data values (with their frequencies). |

| 1VAR Statistic | Definition |
|-----------------------|--|
| MEAN Σ | Mean value of data set. |
| PVAR Σ | Population variance of data set. |
| SVAR Σ | Sample variance of data set. |
| PSDEV | Population standard deviation of data set. |
| SSDEV | Sample standard deviation of data set. |
| MIN Σ | Minimum data value in data set. |
| Q1 | First quartile: median of ordinals to left of median. |
| MEDIAN | Median value of data set. |
| Q3 | Third quartile: median of ordinals to right of median. |
| MAX Σ | Maximum data value in data set. |

When the data set contains an odd number of values, the data set's median value is not used when calculating Q1 and Q3 in the table above. For example, for the following data set:

{ 3 , 5 , 7 , 8 , 15 , 16 , 17 }

only the first three items, 3,5, and 7 are used to calculate Q1, and only the last three terms, 15, 16, and 17 are used to calculate Q3.

Two-variable computed STATS

| 2VAR Statistic | Definition |
|----------------|--|
| MEANX | Mean of x - (independent) values. |
| ΣX | Sum of x -values. |
| ΣX^2 | Sum of x^2 -values. |
| MEANY | Mean of y - (dependent) values. |
| ΣY | Sum of y -values. |
| ΣY^2 | Sum of y^2 -values. |
| ΣXY | Sum of each xy . |
| SCOV | Sample covariance of independent and dependent data columns. |
| PCOV | Population covariance of independent and dependent data columns |
| CORR | Correlation coefficient of the independent and dependent data columns <i>for a linear fit only</i> (regardless of the Fit chosen). Returns a value from 0 to 1, where 1 is the best fit. |
| RELERR | The relative error (for the selected FIT) provides a measure of FIT accuracy for the FIT. |



Plotting

You can plot:

- Histograms (**1VAR**).
- Box-and-whisker plots (**1VAR**).
- Scatter plots of data (**2VAR**). Pressing **FIT** draws a curve to fit the data points according to the current Fit model and calculates regression coefficients.

Once you have entered your data (Numeric view), defined your data set (Symbolic view), and defined your Fit model for two-variable statistics (Symbolic Setup), you can plot your data. You can select up to five Scatter or Box-and-Whisker plots at a time. You can plot only one Histogram at a time.

Statistics aplet's SYMB view keys

| Key | Meaning |
|---|--|
| EDIT | Copies the column variable (or variable expression) to the edit line for editing. Press OK when done. |
| ✓CHK | Checks/unchecks the current data set. Only the checkmarked data set(s) are computed and plotted. |
| C or X | Typing aid for the column variables (C) or for the Fit expressions (X). |
| SHOW | Displays the current variable expression in standard mathematical form. Press OK when done. |
| EVAL | Evaluates the variables in the highlighted column (C1, etc.) expression. |
|  | Menu for entering variable names or contents of variables. |
|  | Menu for entering math operations. |

| Key | Meaning (Continued) |
|--------------------|--|
| DEL | Deletes the highlighted variable <i>or</i> the current character in the edit line. |
| SHIFT CLEAR | Resets default specifications for the data sets <i>or</i> clears the edit line (if it was active). <i>(Note: If SHIFT CLEAR is used the data sets will need to be CHKed again before re-use.)</i> |

To plot statistical data

1. In Symbolic view (**SYMB**), select (**CHK**) the data sets you want to plot.
2. For one-variable data (**1VAR...**), select the plot type in Plot Setup (**SHIFT SETUP-PLOT**). Highlight **STATPLOT**, press **CHOOS**, select either Histogram or BoxWhisker, and press **OK**.
3. For any plot, but especially for a histogram, adjust the plotting scale and range in the Plot Setup view. If you find histogram bars too fat or too thin, you can adjust them with the **HWIDTH** setting. Press **PLOT**. If you have not adjusted the Plot Setup yourself, you can try **VIEWS** select Auto Scale **OK**.

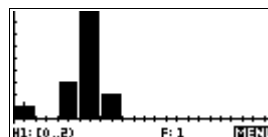


Auto Scale can be relied upon to give a good starting scale which can then be adjusted in the Plot Setup view. Using Auto Scaling is often the best way to plot, as it automatically adjusts the plotting scale to the relevant range.

Plot Types

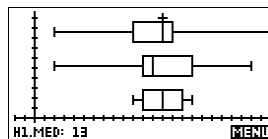
Histogram

One-variable statistics. The numbers below the plot mean that the current bar (where the cursor is) starts at 0 and ends at 2 (not including 2), and the frequency for this column, (that is, the number of data elements that fall between 0 and 2) is 1.



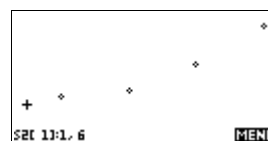
Box and Whisker Plot

One-variable statistics. The left whisker marks the minimum data value (MIN) to the first quartile. The box marks the first quartile, the median, and the third quartile. The right whisker marks the third quartile to the maximum data value.

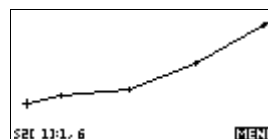


Scatter Plot

Two-variable statistics. The numbers below the plot indicate that the cursor is at the first data point for S2, at (1, 6). Plot Setup controls the plotting symbols.



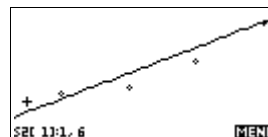
Connected points. To connect the data points as they are plotted, checkmark **CONNECT** in the second page of the Plot Setup. *This is not a regression curve.*



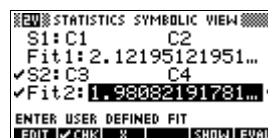
Fitting a curve to 2VAR data

In the Plot view, press **FIT** to turn on **FIT**.... This calculates a curve to fit the checked two-variable data set(s). See “To choose the fit” on page 8-104.

PLOT **MENU** **FIT**
(assuming **2VAR** is set and two data sets are defined and checked in Numeric and Symbolic views)

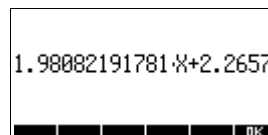


SYMB



SHOW

The expression in Fit2 shows that the slope=1.98082191781 and the y-intercept=2.2657.



Regression coefficients

As shown above, the FIT mode (in Plot view) calculates and draws a curve to fit the data points using the given regression model. It substitutes calculated values for the regression coefficient variables in the Fit expression, and stores the regression coefficients into variables. You can access these variables in HOME.

Correlation

The correlation coefficient is stored in the CORR variable. It is a measure of fit to a *linear* curve only. Regardless of the Fit model you have chosen, CORR relates to the linear model.

Relative Error

The *relative error* is stored in a variable named RELERR. The relative error provides a measure of fit accuracy for all fits, and it *does* depend on the Fit model you have chosen.

The relative error is a measure of the error between predicted values and actual values based on the specified Fit. A smaller number means a better fit.



In order to access these variables after you plot a set of statistics, you must press **[NUM]** to access the numeric view and then STAT display the correlation values. The coefficients are stored in the variables when you access the symbolic view.

Setting up the plot (Plot setup view)

The Plot Setup view (**[SHIFT]** **SETUP-*PLOT***) sets most of the same plotting parameters as it does for the other built-in aplets. See “About the numeric view” on page 2-51. Settings unique to the Statistics aplet are as follows:

Plot type (1VAR)

STATPLOT specifies either a histogram or a box-and-whisker plot for one-variable statistics (when 1VAR... is set). Press **CHOOS** to change the highlighted setting

Histogram width

HWIDTH specifies the width of a histogram bar (a 1VAR plot). This determines how many bars will fit in the display, as well as how the data are distributed (how many values each bar represents).

Histogram range

HRNG specifies the range of values for a set of histogram bars (a 1VAR plot). The range runs from the left edge of the leftmost bar to the right edge of the rightmost bar. You can limit the range to exclude any values you suspect are outliers.

Plotting mark (2VAR)

S1MARK through S5MARK specify one of five symbols to use to plot each data set. Use CHOOS to change the highlighted setting.

Connected points (2VAR)

CONNECT (on the second page), when checkmarked, connects the data points as they are plotted. *This is not a regression curve.* The order of plotting and tracing is according to the ascending order of independent values. For instance, the data set (1,1), (3,9), (4,16), (2,4) would be plotted and traced in the order (1,1), (2,4), (3,9), (4,16).

Trouble-shooting a plot

If you have problems plotting, check that you have the following:

- The correct **1VAR...** or **2VAR...** menu label on (Numeric view).
- The correct Fit (regression model), if the data are two-variable (**2VAR...**). You can change the Fit (as S1FIT through S5FIT) in Symbolic Setup.
- A data set defined as specific data columns (Symbolic view).
- *Only* the data sets to compute or plot are checkmarked (Symbolic view).
- The correct plotting range. Try using VIEWS Auto Scale (instead of PLOT), or adjust the plotting parameters (in Plot Setup) for the ranges of the axes and the width of histogram bars (HWIDTH).
- In **2VAR** mode, ensure that both paired columns contain data, and that they are the same length.
- In **1VAR** mode, ensure that a paired column of frequency values is the same length as the data column that it refers to.

Exploring the graph

The Plot view has menu keys for zooming, tracing, and coordinate display. There are scaling options under VIEWS.

These features are described in “Exploring the graph” on page 2-42.

Statistics aplet’s PLOT view keys

| Key | Meaning |
|------------------------------------|---|
| SHIFT <i>CLEAR</i> | Erases the plot. |
| VIEWS | Offers additional pre-defined views for splitting the screen, overlaying plots, and autoscaling the axes. |
| SHIFT ◀ SHIFT ▶ | Moves cursor to far left or far right. |
| ZOOM | Displays ZOOM menu. |
| TRACE | Turns trace mode on/off. The white box appears next to the option when Trace mode is active.. |
| FIT | Turns fit mode on/off. Turning FIT on draws a curve to fit the data points according to the current regression model. |
| GOTO (2var statistics only) | Jumps to GOTO to enter a value on the line of best fit to jump to or a data point number to jump to. |
| DEFN | Displays the current (<i>defining</i>) expression until the menu key is pressed. |
| MENU | When the labels are off, any menu key turns the (x,y) mode on. When the (x,y) mode is on, the MENU key turns the menu labels back on. |

Calculating predicted values

The functions **PREDX** and **PREDY** estimates (predict) values for X or Y given a hypothetical value for the other. The

estimation is made based on the curve that has been calculated to fit the data according to the specified fit.

Find predicted values

1. In Plot view,
 - Calculate the fit (regression curve) for the data set:
Note: In Symbolic view, your data set must be defined and checkmarked. In Symbolic Setup, the fit type must be set.
 - Press **FIT** menu key and calculate the regression curve. (If the **FIT** key is active press it twice to make it the current regression equation.)
2. Use the down-arrow key to jump to the fit (regression curve) graph. Use the **GOTO** key to enter the value of X. The cursor jumps to the desired point on the fit (regression curve) and the coordinate display shows X and the predicted value of Y.

In HOME,

- Enter $\text{PREDX}(\text{y-value})$ **ENTER** to find the predicted (estimated) value for the independent variable given a hypothetical dependent value.
- Enter $\text{PREDY}(\text{x-value})$ to find the predicted value of the dependent variable given a hypothetical independent variable.
- You can type PREDX and PREDY using the Alpha shift, or you can copy these function names from the **MATH** menu under the Stat-Two category.



In cases where more than one fit curve is displayed, the PREDY function uses the most recently calculated curve. In order to avoid errors with this function, uncheck all fits except the one that you want to work with, or use the Plot View method.
