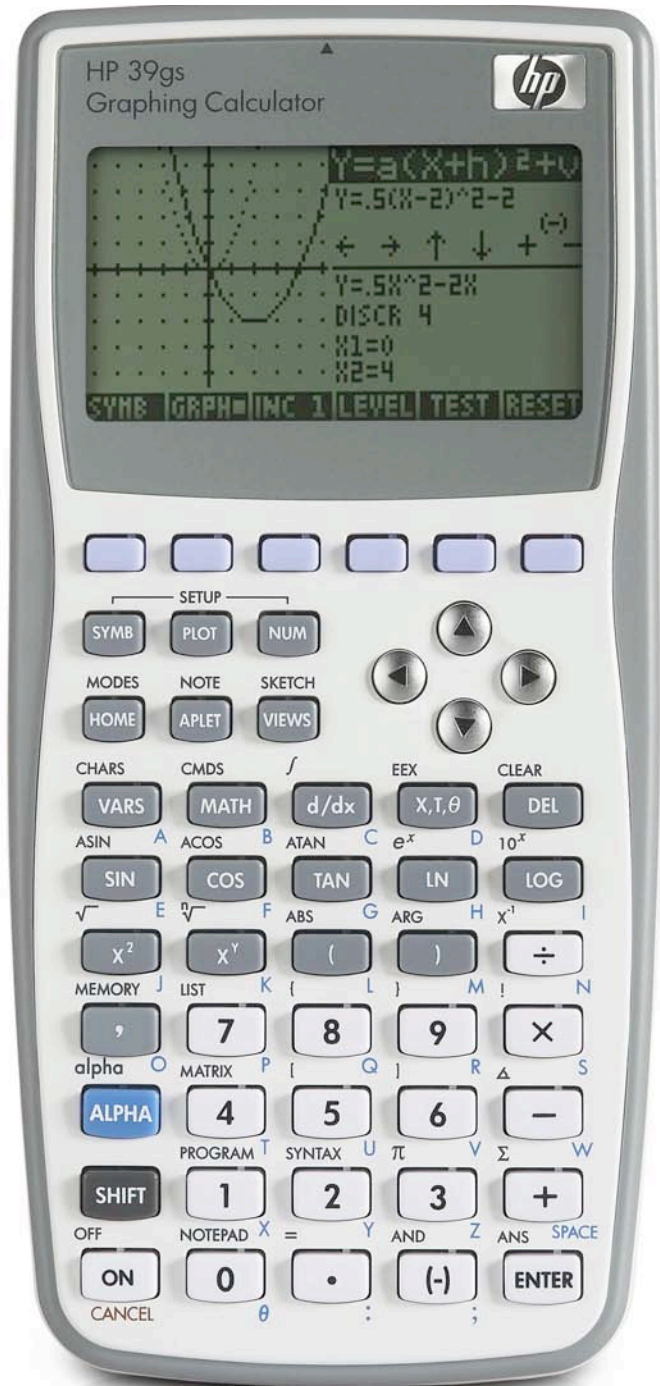**hp calculators**

HP 39gs Statistical Analysis

Checking for an outlier

Comparing data with a box plot

How do I find the line of best fit?

Checking for an outlier

James performed a survey on the number of cars in his friend's families as part of a project, collecting the data shown right. Afterwards, one of his friends told him that his family had 8 cars. James decided to test if this value was an outlier.

One of the common tests for an outlier is to check whether it is within three standard deviations of the mean.

The first step is to enter the data into the NUM view of the Statistics aplet, placing the values into C1 and the frequencies into C2, as shown in Figure 1.

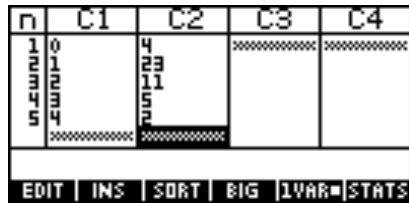| No. of Cars	Freq.
0	4
1	23
2	11
3	5
4	2

Figure 1

Because James' data is contained in two columns, C1 and C2, he must now change to the SYMB view and set those as being "in use". The default is C1 only which would correspond to data in a single column. It is possible to have up to five sets of data defined as H1 through H5.
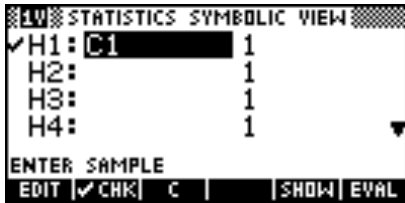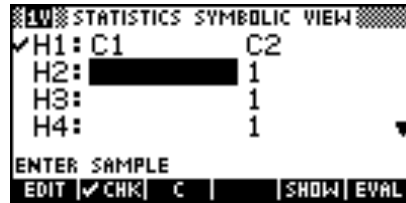

Figure 2

Figure 3

Note: The SYMB view allows considerable flexibility. You can even define a data set using a function of a column. For example, you could define H1 as C1 and H2 as 2*C1+3 and then compare means.

Now change back to the NUM view and press the STATS button (circled below) to retrieve the summary statistics. The result is a scrollable screen containing the value shown below.
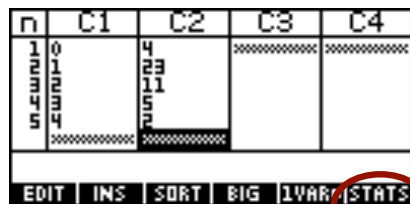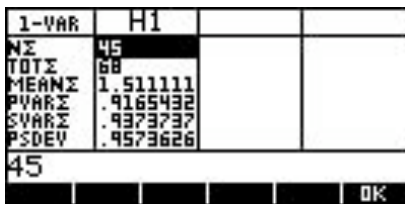

Figure 4

Figure 5

Figure 6

These statistical summary values can be retrieved in the HOME view for use in calculations using the VARS (variables) button.

Change to the HOME view, press VARS and then press screen key 2, labeled APLET (not the APLET button on the keyboard). This displays the variables that are particular to that aplet. Scroll down the list of categories on the left of the screen to the Stat-One group.
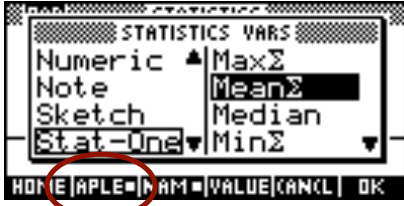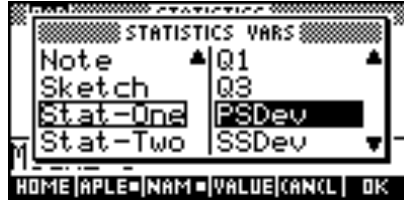

Figure 7

Figure 8

Press the right arrow button to move into the specific Stat-One variables now listed in the right hand half and scroll to MeanSum. Press ENTER to paste the word into the HOME screen. When it appears in the edit line, type "+ 3 * " and do the same to retrieve the population standard deviation PSDev. Press ENTER to perform the calculation.

Notes

1. Pressing screen key 4 (labeled VALUE) before pasting will paste the numerical value rather than the word.
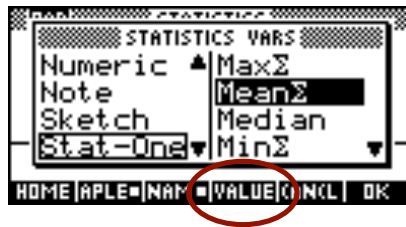

Figure 9

2. If desired, you can use the A..Z button and the CHARS screen to type the name of a variable rather than going through the VARS menu. Case is not important.

The calculation shown below indicates that according to the data in the table, eight cars is beyond three standard deviations from the mean and hence a suspected outlier.
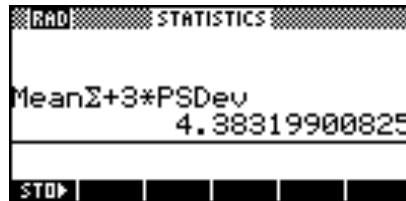

Figure 10

Comparing data with a box plot

Francine wants to compare the heights of the Senior A and Senior B basketball teams. The heights of the team members, starters plus others, are given in centimeters in the table below.

Senior A	195	196	201	202	202	195	195	194	208	197
Senior B	199	204	203	205	206	199	196	201	203	202

Enter the data into the NUM view of the Statistics aplet and then change to the SYMB view to register the fact that both columns C1 and C2 contained single separate sets of data.

Figure 11

Figure 12

Changing to the PLOT SETUP view allows the user to change the plot type from Histogram to Box & Whisker by highlighting STATPLOT and pressing CHOOSE.

Figure 13

Now we must simply press VIEWS and choose Autoscale to see the two Box & Whisker graphs side by side.
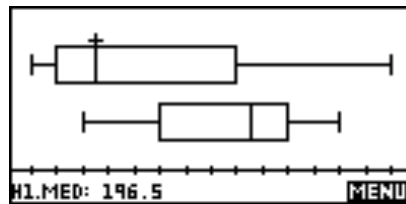

Figure 14

Figure 15

Francine concludes that the Senior A team has a far greater range of heights than the Senior B team, which has more than 75% of the team taller than the majority of the team members of the Senior A's.

How do I find the line of best fit?

A new airline Stowaway Airlines in Western Australia has advertised the following return airfares for the "off-peak" period. Distances are in kilometers and are not necessarily direct.

The financial planner of Stowaway Air wants to make an estimate of the fare from Perth to Alice Springs, a distance of 2850 km.

From Perth to	Distance	Fare
Kalgoorlie	1120	$209
Carnarvon	1610	$259
Exmouth	2210	$319
Karratha	3050	$379
Port Hedland	3260	$379
Broome	4270	$469
Kununurra	5740	$579
Darwin	6570	$609

Start by entering the data into columns C1 and C2 of the Statistics aplet. While in the NUM view, press 1VAR (screen key 5) to set the aplet into bivariate 2VAR data mode.

Figure 16

The default in the SYMB view is for data set S1 to be stored in C1 and C2 so no change is needed.
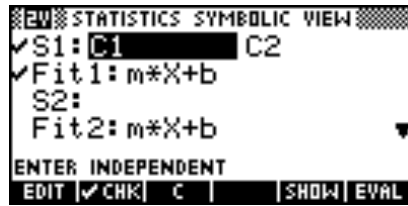

Figure 17

Press VIEWS and choose Autoscale to make the initial choice of axes. This choice can be refined in the PLOT SETUP view.
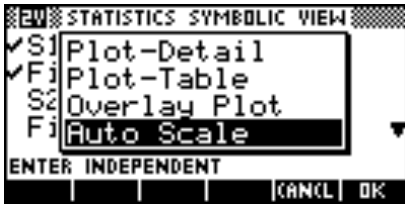

Figure 18

Figure 19

Press VIEWS and choose Autoscale to make the initial choice of axes. This choice can be refined in the PLOT SETUP view. The settings for PLOT SETUP shown below will produce a better looking graph.
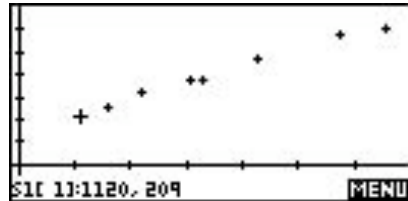

Figure 20

Figure 21

Figure 22

Note that the mark used for the data points has been changed by highlighting S1MARK and pressing CHOOSE.

Figure 23

To superimpose the line of regression on the PLOT view, just press MENU and FIT, as shown in Figure 24. The equation can be viewed by changing to the SYMB view, highlighting the Fit1 equation and pressing SHOW (Figure 25).
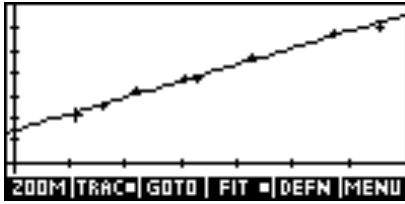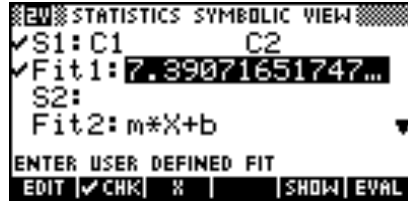
Figure 24

Figure 25

In the example below, the MODES view has been pre-set to Fixed 4 but the equation can also be viewed in full by scrolling left and right.
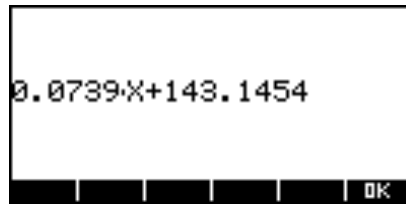
Figure 26

Note: Do not EDIT the equation to view it as this may change the fit type from 'Linear' to 'User defined'. The fit type can be seen in the SYMB SETUP view below, which is only available in this one situation of using 2VAR mode.
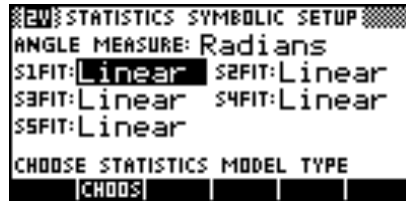
Figure 27

Predictions can be made from the PLOT view. Press PLOT to return to the graph view and look at the bottom of the screen. If the point coordinates are not shown then press MENU until they appear.
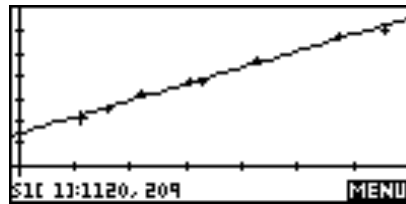
Figure 28

Press the up arrow key to move the trace from the points to the regression line. Now press MENU and GOTO. Enter the value to be predicted of 2850 and press ENTER. The predicted fare is $353.
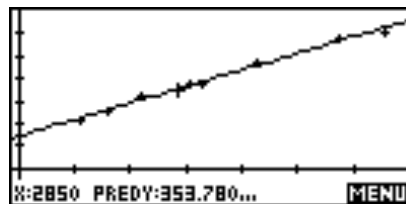
Figure 29

Predictions can also be made from the HOME view using the PREDY function from the MATH menu.
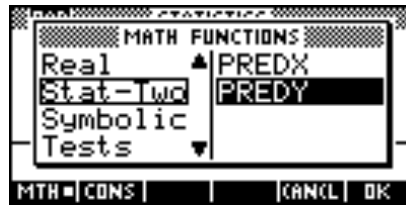

Figure 30

The fit equation can be transferred into the Function aplet by entering the function PREDY(X) into F1(X) and then highlighting it and pressing EVAL (screen key 6).
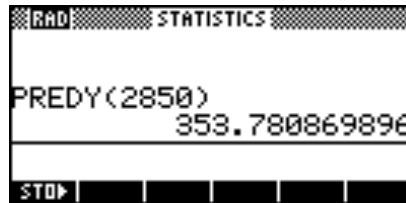

Figure 31

The fit equation can be transferred into the Function aplet by entering the function PREDY(X) into F1(X) and then highlighting it and pressing EVAL (screen key 6).