hp calculators

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Plotting on the HP 49G+

The HP 49G+ calculator provides a host of plots to allow the user to visualize data or relationships between them. The GREEN shifted functions of the top row of keys on the HP 49G+ allow access to many of the input forms where plotting specifications may be entered.

Parametric Plots

Parametric plots can be thought of as a plot of complex function of parameter T plotted over the complex plane. The (x,y) vector points may be used to draw the figures. Alternatively, parametric plots can be thought of as a system of two equations X=X(T) and Y=Y(T), where the Y(T) represents the imaginary part. Parametric plots can also be used to plot vertically, as an example shows.

The 2D/3D (PLOT SETUP) Form

The 2D/3D (PLOT SETUP) Form is accessed from the LEFT shifted function of the F4 key by pressing and **holding** down ↰ and then pressing F4 , to access 2D/3D . When pressed, a form is displayed with a number of choices related to plotting.

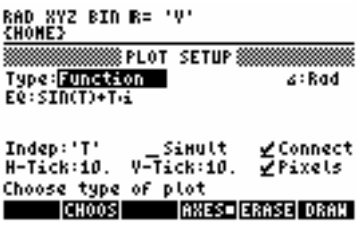

Figure 1

The first choice deals with choosing the plot type. The selections for plot type are displayed by pressing F2 , which has the label CHOOS right above it. The plot types include plotting functions, polar plots, parametric plots, differential equation plots, conic plots, truth plots, histograms, bar charts, scatter charts, slopefield charts, fast 3D charts, wireframe plots, Ps-contour plots, Y-slice plots, gridmap plots, and Pr-surface plots. A CHOOSE Box appears as shown below.

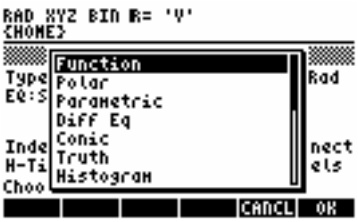

Figure 2

The Plot Setup form also allows the user to specify the equation being plotted if the cursor is placed on the EQ: field and the EDIT menu label is pressed – this invokes the EquationWriter to allow for the construction of the equation to be plotted. The form also allows the angle measure used and the independent variable to be specified (note: the default is often 'X', but for parametric plots, this will be changed to 't'). In addition, several check boxes that are used to indicate whether the plotted points should be automatically connected together by the calculator and the horizontal and vertical tick marks used for the graph. The form also allows for the plotting of more than one function at a time.

The Y= Form

The Y= form provides another way to enter your equation or function to plot. Press and **hold** down ↰ and then press F1 , which is Y= . The following form appears:

Figure 3

Press F2 , with label ADD above it, to add a function using the equation writer.

The WIN Form

The WIN form allows for the plot window specifications to be entered and changed. The lower and upper horizontal and vertical values displayed on the graph can be changed. The lower and upper value for the independent variable can also be specified on this form. To open the WIN form, press and **hold** down ↰ and press F2 , which is WIN . The following form appears:

Figure 4

The menu label ERASE will discard the results of a previous plot and the menu label DRAW will begin the plot.

Examples of Parametric Plotting

Example 1: Plot the equation below as a parametric plot.

3 SIN(3t) + 2 SIN(4t) i

Solution: ↰ 2D/3D ADD → ▲ ▼ ▼ ENTER (do not forget to press AND hold the ↰ key while pressing the 2D/3D key)
▼ ▼ EDIT ◀ ◀ ALPHA ↰ T ENTER

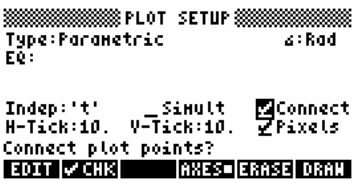

Figure 5

ENTER ↰ Y= ADD 3 SIN 3 ALPHA ↰ T ▲ ▲ ▲ ▲

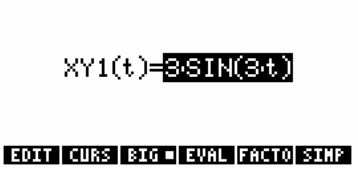

Figure 6

+ 2 SIN 4 ALPHA ↰ T ▲ ▲ ▲ ▲ × ALPHA ↰ I ENTER

Figure 7

Figure 8

Answer: The plot is displayed. A curve called lissajous figure is drawn.

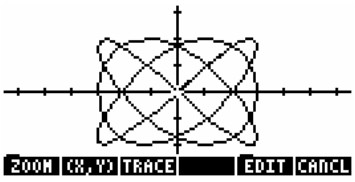

Figure 9

To get out of the Plot Environment press .

Example 2: Plot the equation below as a parametric plot.

(2*SIN(T),COS(T))

Solution: (do not forget to press AND hold the key while pressing the key)

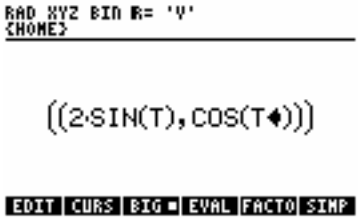

Figure 10

(Note: if the calculator is in real mode then the following dialog box might appear)

Figure 11

If this happens, just answer YES by pressing and proceed.

ENTER ◁ WIN 3 +/- ENTER 3 ENTER 2 +/- ENTER 2 ENTER 0 ENTER 2 SPC ◁ π ▷ × ▷ →NUM ENTER

Figure 12

ERASE DRAW

Answer: The plot is displayed. An ellipse is drawn.

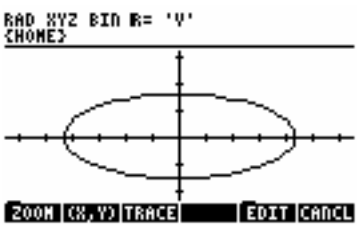

Figure 13

To get out of the Plot Environment press ON.

Example 3: Plot the SIN(T) equation as a vertical plot

Solution: ◁ 2D/3D ERASE ▷ ▲ ▼ ▼ ENTER (do not forget to press AND hold the ◁ key while pressing the 2D/3D key)
▼ EDIT ▷ CLEAR ◁ ( ) SIN ALPHA T ▶ ▷ , ALPHA T ENTER ' ALPHA T ENTER

Figure 14

If the calculator is in real mode then a question asking if complex mode should be turned on may be displayed. Answer YES by pressing ENTER and proceed

ENTER ◁ WIN 3 +/- ENTER 3 ENTER ◁ π +/- ▷ →NUM ENTER ◁ π ▷ ▷ →NUM ENTER
0 ENTER 2 SPC ◁ π × ▷ →NUM ENTER

Figure 16

ERASE DRAW

Answer: The plot is displayed. A nice, vertical sine curve is drawn.

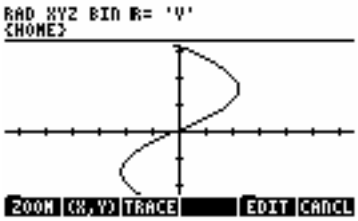

Figure 17

To get out of the Plot Environment press ON.