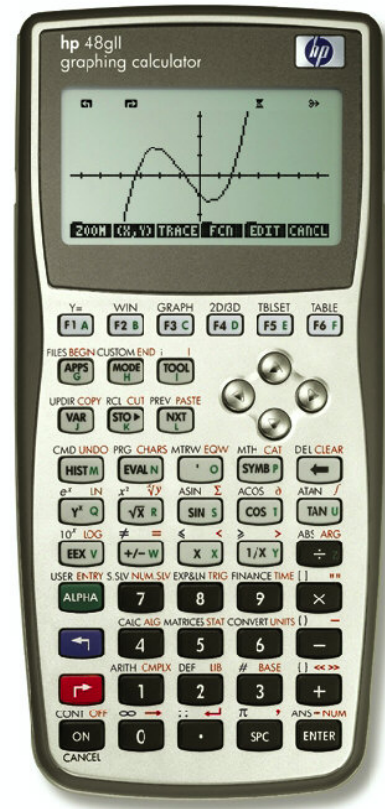# hp calculators

HP 48GII The basics of plotting functions

Plotting on the HP 48GII

The 2D/3D (PLOT SETUP) Form

The WIN Form

Examples of plotting functions

Plotting on the HP 48GII

The HP 48GII calculator provides a host of plots to allow the user to visualize data or relationships between them. The BLUE shifted functions of the top row of keys on the HP 48GII allow access to many of the input forms where plotting specifications may be entered.

The 2D/3D (PLOT SETUP) Form

The 2D/3D (PLOT SETUP) Form is accessed from the LEFT shifted function of the $\boxed{F4}$ key by pressing and **holding** down $\boxed{\leftarrow}$ and then pressing $\boxed{F4}$, to access $\textit{2D/3D}$. 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 $\boxed{F2}$, 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 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 $\boxed{\leftarrow}$ and press $\boxed{F2}$, which is $\textit{WIN}$. The following form appears:

Figure 3

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

Examples of plotting functions

Example 1:   Plot Y = X^2 – 4 from X = -3 to +3. Display values of Y from –6 to +6.

Solution:　　[←] _2D/3D_ [CHOOS] [→] [▲] [ENTER] (do not forget to press AND hold the [←] key while pressing the _2D/3D_ key)
　　　　　　[▼] [EDIT] [→] CLEAR [X] [Yˣ] [2] [▶] [−] [4] [ENTER] [X] [ENTER]
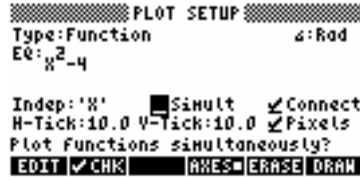
```
▒▒▒▒▒▒▒▒▒PLOT SETUP▒▒▒▒▒▒▒▒▒
Type:Function            ∡:Rad
EQ: ₓ²-4

Indep:'X'     ■Simult   ✓Connect
H-Tick:10.0 V-Tick:10.0 ✓Pixels
Plot Functions simultaneously?
 EDIT ✓CHK      AXES■ ERASE DRAW
```
Figure 4

[ENTER] [←] _WIN_ [6] [+/−] [ENTER] [6] [ENTER] [6] [+/−] [ENTER] [6] [ENTER] [3] [+/−] [ENTER] [3] [ENTER]

```
▒▒▒▒▒▒PLOT WINDOW - FUNCTION▒▒▒▒▒▒
H-View:-6.0000           6.0000
V-View:-6.0000           6.0000
Indep Low: -3.    High:3.
       Step: Default    _Pixels

Enter indep var increment
 EDIT             AUTO ERASE DRAW
```
Figure 5

[ERASE] [DRAW]
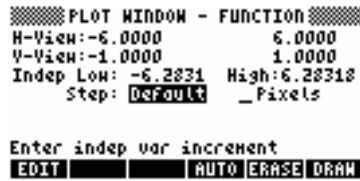
Answer:　　The plot is displayed.
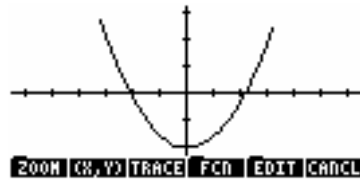

```
 ZOOM (X,Y) TRACE  Fcn  EDIT CANCL
```
Figure 6

To move the cursor along the graph and read the (X,Y) coordinates of the cursor's position, press [TRACE] and [(X,Y)] (which is actually displayed as (X,Y) in the reverse menu label font on the calculator screen) then move the cursor using the [◀] and [▶] arrow keys. Press [F2] to bring the menu labels back on the screen. To get out of the Plot Environment press [CANCL].

Example 2:　　Plot the equation Y = SIN(X)/X from −2π to +2π. Assume Radians angle mode.

Solution:　　[←] _2D/3D_ [CHOOS] [→] [▲] [ENTER] (do not forget to press AND hold the [←] key while pressing the _2D/3D_ key)
　　　　　　[▼] [EDIT] [→] CLEAR [SIN] [X] [÷] [X] [ENTER] [X] [ENTER]

```
▒▒▒▒▒▒▒▒▒PLOT SETUP▒▒▒▒▒▒▒▒▒
Type:Function            ∡:Rad
EQ: SIN(X)
        X

Indep:'X'     ■Simult   ✓Connect
H-Tick:10.0 V-Tick:10.0 ✓Pixels
Plot Functions simultaneously?
 EDIT ✓CHK      AXES■ ERASE DRAW
```
Figure 7

[ENTER] [←] _WIN_ [6] [+/−] [ENTER] [6] [ENTER] [1] [+/−] [ENTER] [1] [ENTER] [2] [←] π [×] [+/−]
[→] →NUM [ENTER] [2] [←] π [×] [→] →NUM [ENTER]

```
▒▒▒▒▒▒PLOT WINDOW - FUNCTION▒▒▒▒▒▒
H-View:-6.0000           6.0000
V-View:-1.0000           1.0000
Indep Low: -6.2831  High:6.28318
       Step: Default    _Pixels

Enter indep var increment
 EDIT             AUTO ERASE DRAW
```
Figure 8

▒▒▒▒▒ ▒▒▒▒▒

Answer: The plot is displayed.
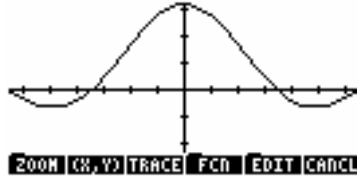
Figure 9

To move the cursor along the graph and read the (X,Y) coordinates of the cursor's position, press ▒▒▒▒▒ and ▒▒▒▒▒ (which is actually displayed as (X,Y) in the reverse menu label font on the calculator screen) then move the cursor using the ◄ and ► arrow keys. Press `F2` to bring the menu labels back on the screen. To get out of the Plot Environment press ▒▒▒▒▒.

Example 3: Plot the equation Y = LN(X)/TAN(X) from 0 to +2π. Assume Radians angle mode. Display the horizontal view from 0 to +2π. Display the vertical view from –10 to +10.

Solution: `←` *2D/3D* ▒▒▒▒▒ `→` `▲` `ENTER` (do not forget to press AND hold the `←` key while pressing the *2D/3D* key)
            `▼` ▒▒▒▒ `→` *CLEAR* __ *LN* `TAN` `X` `÷` `TAN` `X` `ENTER` `X` `ENTER`

Figure 10

`ENTER` `←` *WIN* `0` `ENTER` `2` `←`π__ `×` `→` →NUM `ENTER` `/` `0` `+/-` `ENTER` `/` `0` `ENTER`
`0` `ENTER` `2` `←`π__ `×` `→` →NUM `ENTER`

Figure 11

▒▒▒▒▒ ▒▒▒▒▒

Answer: The plot is displayed.
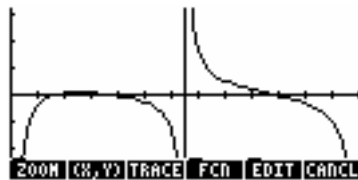
Figure 12

To move the cursor along the graph and read the (X,Y) coordinates of the cursor's position, press ▒▒▒▒▒ and ▒▒▒▒▒ (which is actually displayed as (X,Y) in the reverse menu label font on the calculator screen) then move the cursor using the ◄ and ► arrow keys. Press `F2` to bring the menu labels back on the screen. To get out of the Plot Environment press ▒▒▒▒▒.