

[4.11] 3D data plots

The 89/92+ can plot 3D functions in a few ways, but they cannot plot 3D data, that is, a set of discrete points in three dimensions. This tip shows how to trick the built-in 3D plotter into drawing a wire frame plot of 3D data points. This is not a true three dimensional plot of the data points, but at least you can get a picture of it. This method will *not* work for arbitrary lists of x-, y- and z-data points: you must have a data point for each xy coordinate.

The trick is to set the plotted z= function as a the matrix of data points, and scale the x- and y-axis maxima and minima so that the x-axis coordinates are the matrix row indices, and the y-axis coordinates are the matrix column indices. The steps to create the plot are:

1. Set the Graph mode to 3D.
2. In the Y= editor, set the desired z= function to $matrix[x,y]$, where *matrix* is the name of the matrix. Push [F1] Format, and choose Wire Frame or Hidden Surface.
3. Push [WINDOW]. Set *xmin* and *ymin* to 1. Set *xmax* to the number of rows in the matrix to plot. Set *ymin* to the number of columns in the matrix to plot. Set *xgrid* to *xmax* - 1. Set *ygrid* to *ymin* - 1. Set *zmin* and *zmax* as needed to span the range of the data in the matrix to plot.
4. Press [GRAPH] to plot the data.

As an example, use this program to create a matrix *mat1* to plot:

```
t()  
Prgm  
local k,j  
  
for k,1,10  
  for j,1,10  
    ln(k)*j^2→mat1[k,j]  
  endfor  
endfor  
  
EndPrgm
```

Following the steps above:

1. Press [MODE] [RIGHT] [5] [ENTER] to select 3D graphing mode.
2. Press [Y=] and move the cursor to the desired z-plot; we'll use z1. Enter $mat1[x,y]$ and press [ENTER], so that plot z1 is checked, and the display shows $z1 = mat1[x,y]$.
3. Press [WINDOW]. Move the cursor to *xmin* and enter 1. Move the cursor down to *xmax* and enter 10, since the matrix has 10 rows. Move the cursor down to *xgrid* and enter 9, since $xmax - 1 = 9$. Move the cursor down to *ymin* and enter 1. Move the cursor down to *ymin* and enter 10, since the matrix has 10 columns. Move the cursor down to *ygrid* and enter 9, since $ymin - 1 = 9$. Set *zmin* to 0, and set *zmax* to 230.3.
4. Press [GRAPH] to plot the data.

After the data is plotted, you can use the cursor movement keys as usual to change the viewing angle.

(Credit to anonymous poster on TI 89/92+ Discussion Group)