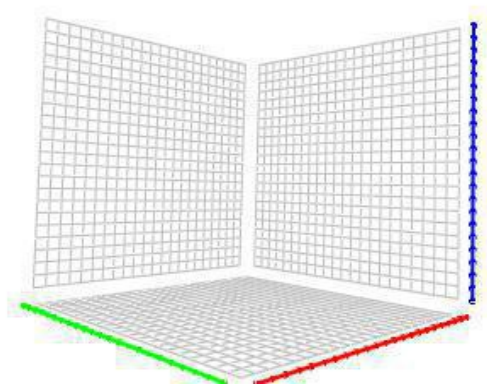


3D graphs in MatDeck

There are two ways of inserting a 3D graph in MatDeck. You can place it in the document like an object, or create a graph widget.

To insert a graph like an object, you can use the Insert tab > 3D Graph icon and then choose the place in the document to place that graph.



Empty 3D graph object

To insert a graph widget, create a variable that contains the graph3d function within itself.

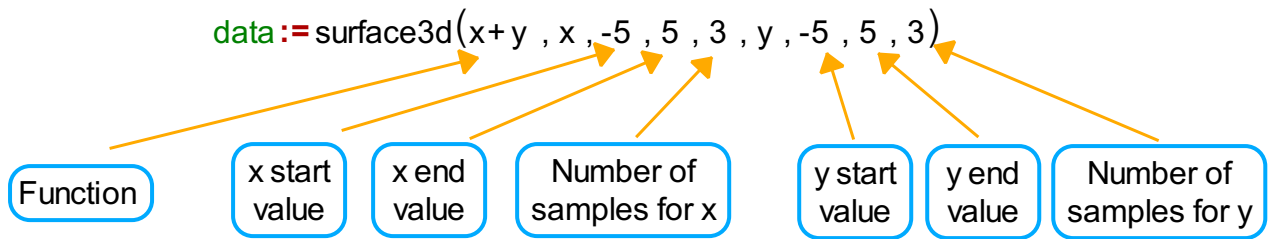
```
a1 := graph3d(0 , data matrix)
```

The zero value in the first argument means that this is the top level widget, because widgets are parent-child based.

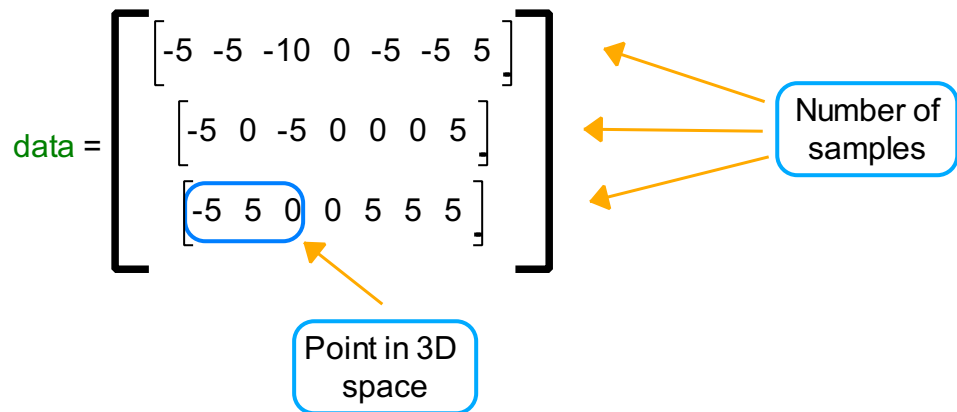
For more information about widgets see GUIUserManual.pdf from the User Manual document.

When a widget is created it is not visible, you can choose to embed it into a document (function **embed widget()**) or you can choose to show it as an independent object in a new window on the screen (function **show()**).

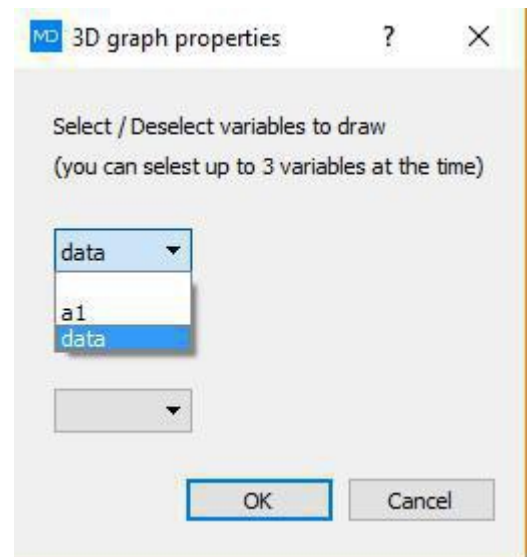
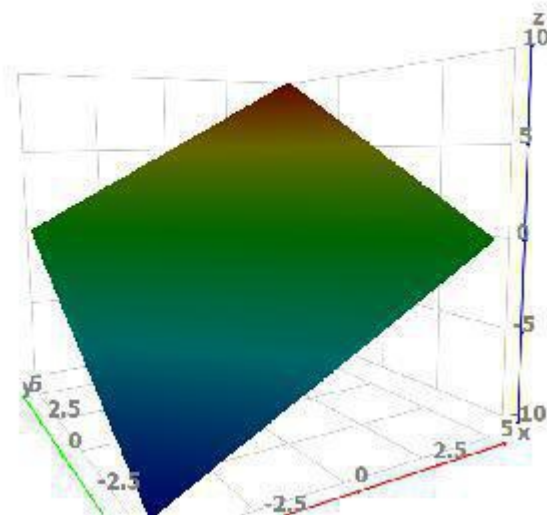
MatDeck 3D plots and handles the data stored in a column vector which has vectors within itself. Every vector represents data for one slice of the graph. To create the data use the function **surface3d**.



Data that we have created with the surface3d function looks like this.



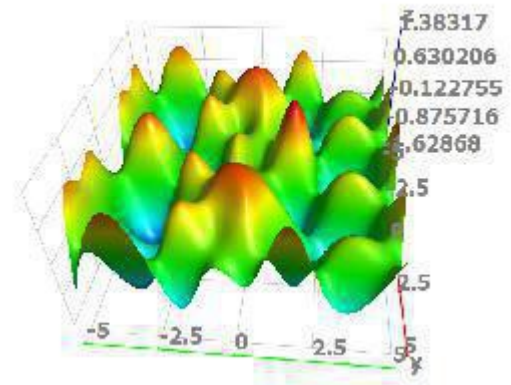
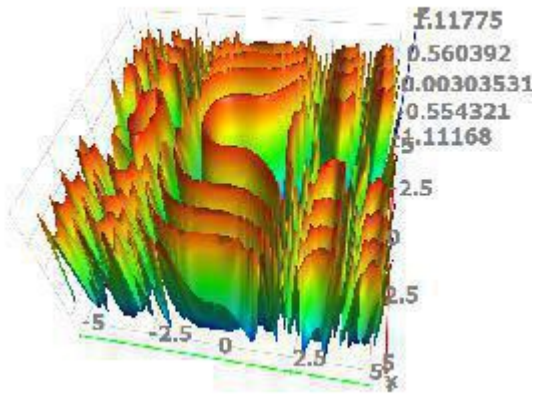
To plot the data variable, open the context menu on the 3D graph object, go to Properties and select the variable from the drop down list.



Changes to the number of samples argument will affect the accuracy of the graph

```
data1 := surface3d( sin(x^2 - y^3), x, -5, 5, 50, y, -5, 5, 50 )
```

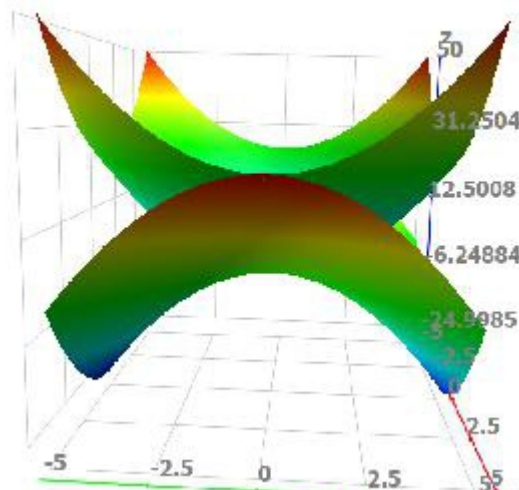
```
data2 := surface3d( sin(x^2 - y^3), x, -5, 5, 10, y, -5, 5, 10 )
```



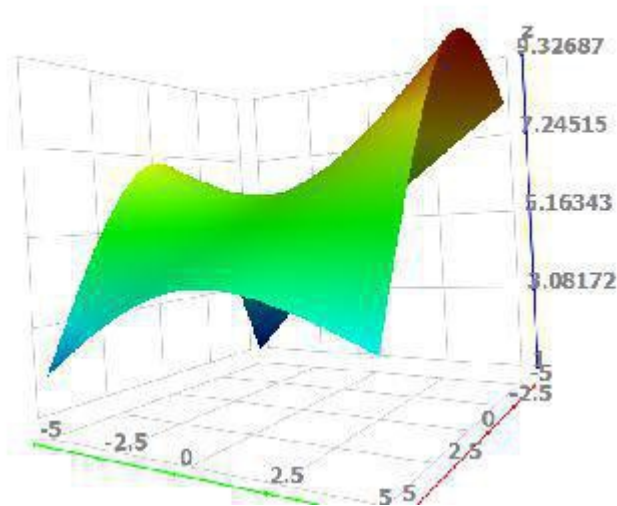
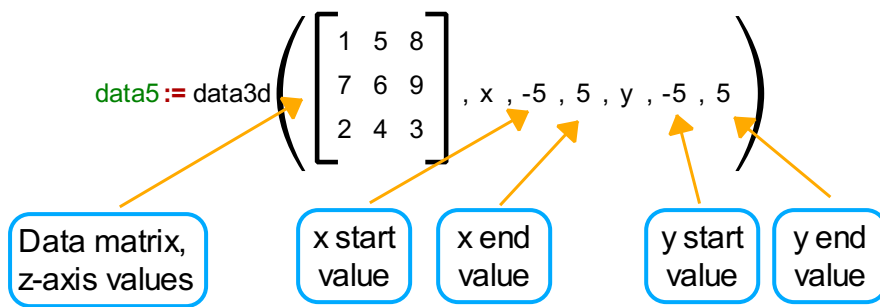
If we want to plot several graphs on the same graph object, create the graphs data, save it in variables, and from the 3D graph properties menu choose variables that you want to plot.

```
data3 := surface3d( x^2 + y^2, x, -5, 5, 50, y, -5, 5, 50 )
```

```
data4 := surface3d( x^2 - y^2, x, -5, 5, 50, y, -5, 5, 50 )
```



Another useful function is **data3d**. This function creates a vector to 3D plot from the inserted matrix, where the matrix values are considered as the z-axis data.



When we talk about plot formatting, there are a wide range of formatting options that you can implement in your graph: add axis names, change axis resolution and steps, change axis ratio, show the coordinate planes, find intersections and peaks, choose between linear and cubic splines, show origin points,...