VectorGraphics

---- A package for 3D visualization of vectors, curves, surfaces and vector fields

The software package 'VectorGraphics' has been developed by MF MARITZ and is available to students to use. It consists of a suite of subroutines and functions for 3D visualization of vectors, curves, surfaces, and vector fields. It runs either in MATLAB (university licence) or in OCTAVE (freeware under GNU licensing).

Instructions for downloading the package:

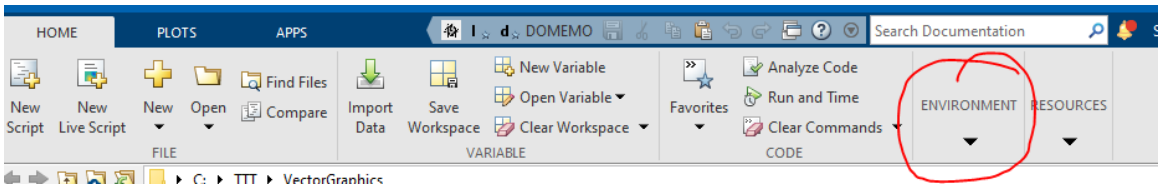
Create a folder of your choice, and name it conveniently. In the examples below the path name 'C:\TTT\VectorGraphics\' will be used as an example.

Sign in on SunLearn and go to the last topic, labelled *Vector Graphics Routines for MATLAB or OCTAVE*. Download these files in the folder you have created. You may alternatively download it from the web site https://appliedmaths.sun.ac.za/TWB242/, and click on the tab 'DOWNLOAD', then on 'D3-PACKAGE'.

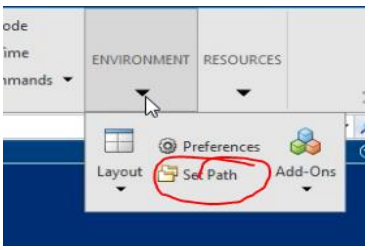
MATLAB

Instructions for setting the path:

Once you have MATLAB running, got to the top bar and click on [ENVIRONMENT]

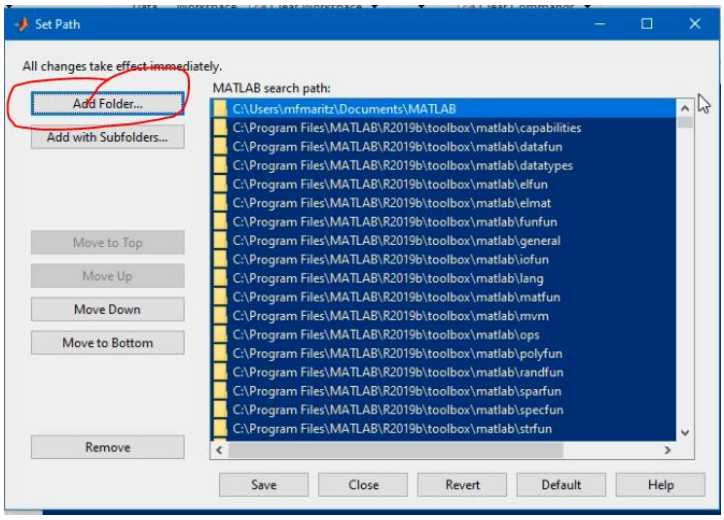


Then click on [Set Path]

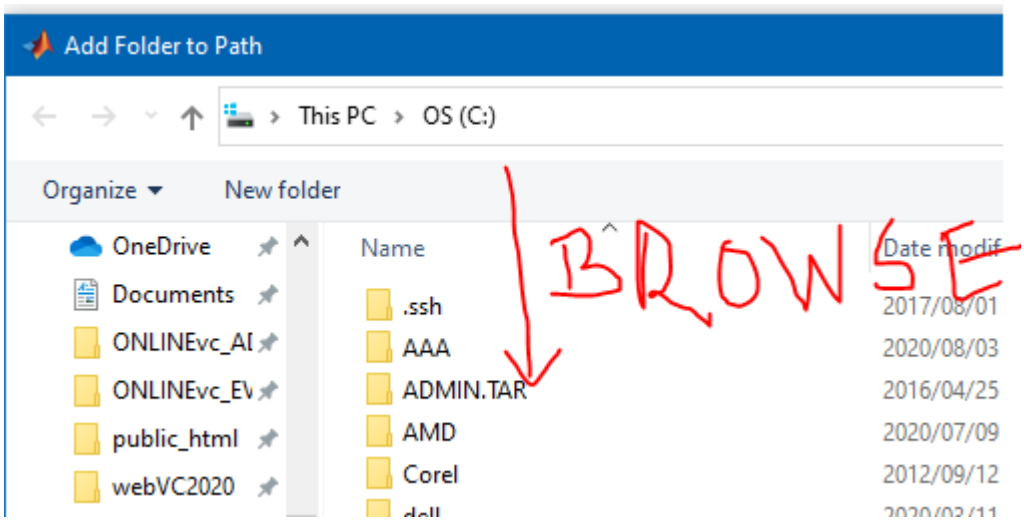


The ‘Set Path’ window will open.

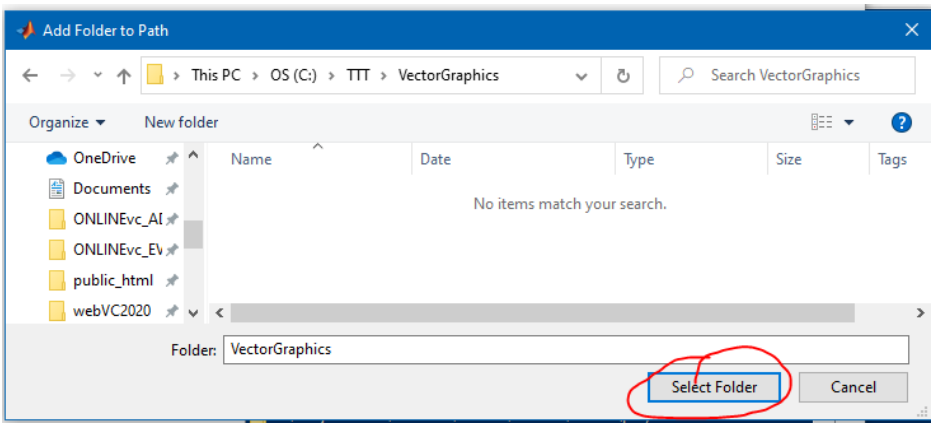
Then click on [Add Folder].



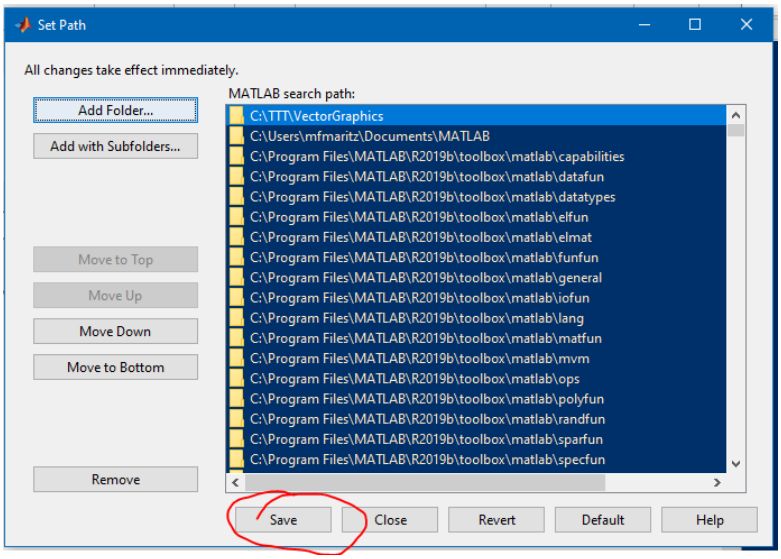
A file browser opens. Then browse to the folder you have created (containing the downloaded files)



Once you have selected the folder, press [Select Folder]



Then press [Save] on the *Set Path* window again.



MATLAB will now be able to access all these routines.

OCTAVE

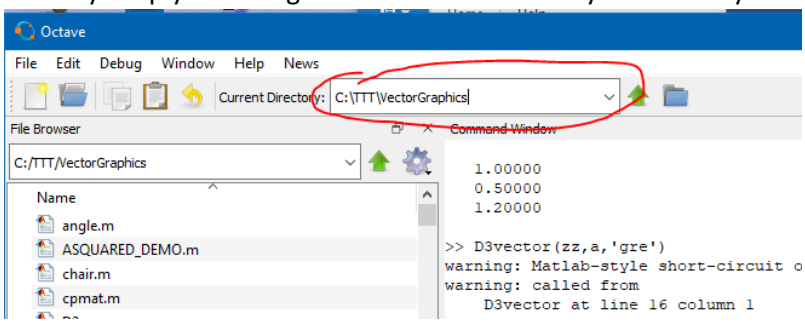
Octave is freeware software that emulates a MATLAB environment. Many of the typical MATLAB commands are available in OCTAVE and their syntax the same (though OCTAVE still has a smaller instruction set than MATLAB, and some results, such as graphical rendering, are not quite the same quality.)

If you do not have MATLAB available, OCTAVE may be a suitable alternative.

Octave is downloadable from the following link:

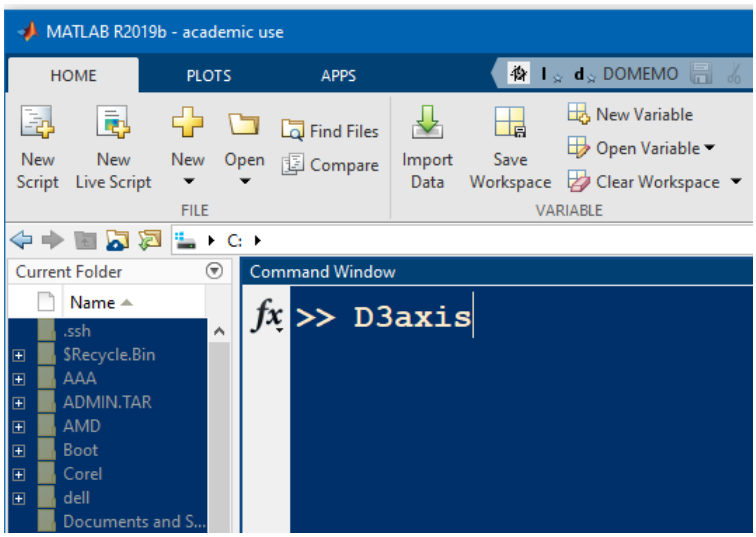
https://www.gnu.org/software/octave/download.html\

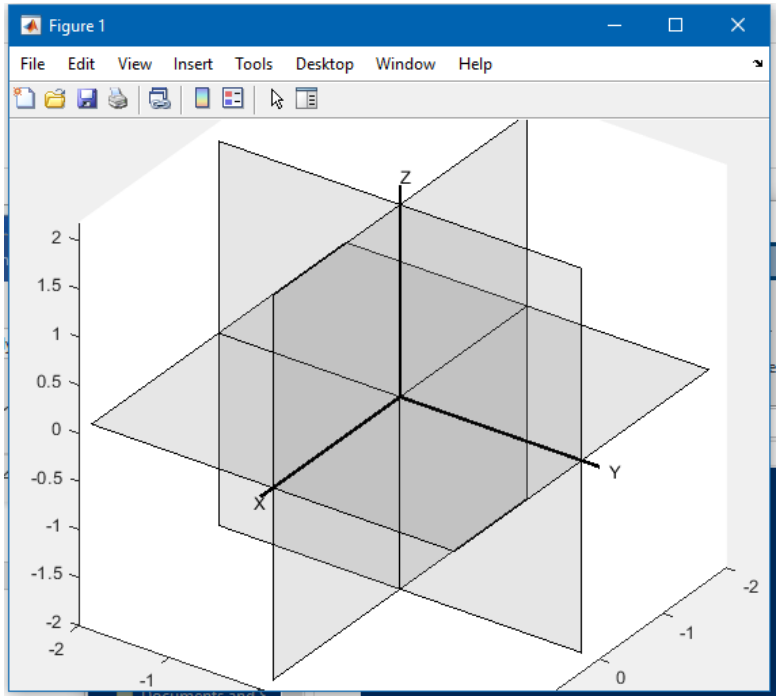
In OCTAVE it is best to make the folder in which the D3 routines lie the *current directory*. This is done by simply browsing in the 'Current Directory' field until you are at the chosen folder.



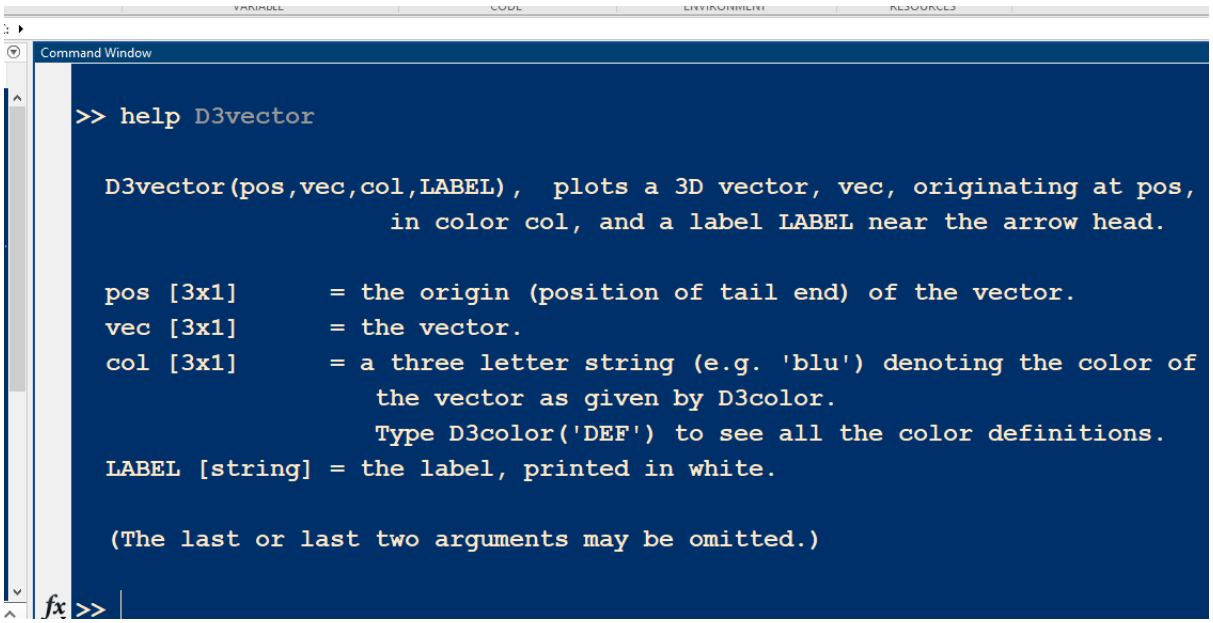
Using VectorGraphics

The first command to be executed, is always ‘D3axis’. Type this in the command window next to the MATLAB prompt ‘>>’ and the 3D axes will open in a new window.





If you want to see the syntax of a particular command, type >> help … the command … in the command window. For example, to see the syntax of ‘D3vector’ type ‘>> help D3vector’.



A list of some of the available commands is here:

D3axis	D3axis(sca,alpha), creates a 3D system of axis with axes X, Y, and Z.
D3vector	D3vector(pos,vec,col,LABEL), plots a 3D vector, vec, originating at pos, in color col, and a label LABEL near the arrow head.
D3line	D3line(shiftvec,dirvec,col), plots a 3D line given by r = shiftvec + t*dirvec (t a parameter), in color col.
D3plane	D3plane(normal,scalar,col), plots a 3D plane given by normal dot r = scalar, in color col.
D3curve	D3curve(FUNCSTRING,trange,col), plots a 3D parametric space curve in color col given by the three equations in the string FUNCSTRING containing x, y, and z as functions of t.
D3planeparametric	D3plane(shiftvec,dirvec1,dirvec2,col), plots a 3D plane given by r = shiftvec + t*dirvec1 + s*dirvec2 (t and s parameters), in color col.
D3surface	D3surface(FUNCSTRING,xrange,yrange,col), plots a 3D space surface in color col given by the equation in the string FUNCSTRING containing an equation in x and y, (assigned to z).
D3contour	D3contour(FUNCSTRING,xrange,yrange,col), plots a the 2D contours of a surface in color col given by the equation in the string FUNCSTRING containing an equation in x and y, (assigned to z).