

## MA30170/MA50170 Numerical Solution of PDEs I

### **MATLAB essentials**

**Starting MATLAB.** The following procedure applies to a BUCS campus PC in a PC Lab; it will be similar for other settings. You can also access the BUCS computers remotely by logging onto a BUCS terminal server (see the BUCS information pages, e.g., <http://www.bath.ac.uk/bucs/networking/connectfromhome/RemoteDesktop/>). To access your file store on BUCS you may need to use a VPN connection, see <http://www.bath.ac.uk/bucs/networking/connectfromhome/virtualprivatenetworkvpn/>.

**Starting a MATLAB session.** MATLAB is located on the BUCS GigaTerms server; see <http://www.bath.ac.uk/bucs/tools/windowsterminalservices/Gigaterms/index.html> for how to access this server (If you are logged on to Windows with your BUCS account, select 'Start → Programs → More Applications → gigaterms'). On GigaTerms, select 'Start → Programs → MATLAB'. In the next sub-menu, select the current version 'R2010b' and then click on 'MATLAB R2010b' to start the package. After some the time MATLAB window appears and you will see the command line prompt `>>` in the command sub-window. You may have to change the 'current directory' from the default directory (the MATLAB installation directory) to your 'My documents' folder or another folder of your choice. To do so, use the 'current directory selector' in the toolbar of the MATLAB window and browse for your chosen folder. You should now be ready to use MATLAB.

**Terminating your session.** To finish a MATLAB session, type `exit` at the prompt `>>`. Alternatively, you can click File/Exit in MATLAB.

**Using MATLAB.** To refresh your memory and familiarise yourself with MATLAB again, the built-in routines `demo` and `help` may help.

**The demo.** To run the demo type `demo` at the prompt `>>`. A MATLAB demo window opens up. It contains examples of the use of many MATLAB features listed on the left-hand side of the window. Start the matrices demo, and go through the items `basic matrix operations` and `matrix manipulation`. Read what it says in the dialogue box as you go through the slide-show player. Some of the items there are more advanced than we will need in this course, so you should not feel that you need to understand everything you see. However, try to get a feel for the simplest commands for adding and multiplying vectors and matrices. When you have completed this you may find it entertaining to look at some of the other features explained in the demo, such as `visualisation`, `gallery` and `games`.

**Online Help.** This facility is excellent and you may find yourself using it often. There are two windows-based help facilities. Firstly, typing `helpwin` gives you a simple menu-driven list of all the MATLAB commands. You can look at the manual page for any command

by scrolling down far enough down the menu. Use this facility to find the manual page for the command `plot`, which resides in the directory `graph2d`. Read the manual page for `plot`. There are also several plotting examples in the demo program: Have a look at `Language/Graphics` and then `Line plotting in the demo`.

A much more sophisticated web-type help facility can be started by pressing F1 or selecting 'Help/MATLAB Help'. Alternatively you can type `helpdesk`. Finally, if you know the name of the command you are interested in, you can simply ask for help on it at the MATLAB prompt. For example to find out about the `while` command, type `help while` at the prompt `>>`.

**Recording a MATLAB session.** Any MATLAB session may be recorded by typing `diary filename`, where `filename` is any name you choose. Everything that appears in your MATLAB window is then recorded in `filename` until you type `diary off`. Type `help diary` to find out about this.

**MATLAB programs.** In order to keep a permanent record of a sequence of MATLAB operations, you will find it useful to write MATLAB programs. A MATLAB program should have a file name with a suffix `.m`. To start writing, type `edit foo.m` and use the internal editor. Lets suppose you have written a program called `foo.m`. To run it, make sure you selected the directory in which it is stored. In the MATLAB command window, simply type `foo`. Your sequence of instructions will be executed and the results shown on the screen. You can write the results to a file by using the `diary` command.

During the course I will provide several programs for you. To work with them, you need to copy them to your current MATLAB directory, e.g., your 'My documents' folder. Use a browser to go to the course home page. Then select 'Save Link ..' and browse for your 'My documents' folder. Save it there and you can run the program in a MATLAB session.

**Printing.** Anything printed from an open access campus PC will come out on the laser printer in the reprographics section of the library and there is a price per sheet to pay. To find out how to print look at the BUCS page <http://www.bath.ac.uk/bucs/services/librarypcuse/printing/index.html>. From MATLAB, select 'File/Print' but take a preview first to avoid frustration.