

Math 2250
Introduction to Matlab
Fall 2011

This document is an introduction to Matlab for Math 2250/2280 students. You will be using Matlab in Math 2250/2280, in order to solve problems and do computer projects. You can think of Matlab as an extremely powerful programmable calculator with many incredibly useful features. Matlab will be used primarily to do numerical calculations as opposed to symbolic calculations. You will use Matlab to solve problems where the answer is a number, vector, or matrix, rather than a function. To solve symbolic problems, you will need to use a program called Maple. While Maple can also solve numerical problems, Matlab is much more efficient and well designed for this process. It is recommended that students understand how to use both programs. Your specific assignments and requirements will depend on your particular Math 2250/2280 instructor.

Matlab is updated periodically, and the Mathematics Department is currently using version 7.9.0. There are some backwards compatibility problems with Matlab, so documents created with newer versions may not run as expected on older ones. However, this should not be a problem considering the simple commands we will use in this course. Student computers around campus (Engineering, Marriott, Math Department, Heritage Commons) have Matlab software installed, and in most places you can find both the earlier and later versions. As an enrolled student at the University of Utah, you are allowed to use Matlab on these computers for free. You can also purchase a student version of Matlab 7.9.0 online for \$99, directly from the vendor, MathWorks. Any version of Matlab you use includes an extensive help menu with detailed explanations about each command.

When you open Matlab you can find a series of demo videos by going to the "Help" menu and selecting "Demos". It is recommended that you watch the first three videos in this list to help you get started in Matlab. From then on, you will learn to use Matlab the same way you learned to use Microsoft Word, i.e. by using it, using the help features, and asking friends, lab assistants, TAs and teachers when you get stuck.

The Math 2250/2280 projects can usually be done using Maple, Matlab, Mathematica or other math software. But, most Math Department support for these projects will assume you're using Maple.

1) **Computer Labs on campus, and logging on/off:**

There are many labs on campus, follow the link <http://www.it.utah.edu/services/connected/labs.html>. Most of these labs have Matlab software, and in most of these labs you log on using your University ID and password, i.e. the same way you log on to register for courses, get transcripts, etc. For example, if you are using the MMC labs this is the way you log on to your computer. It is generally true that when you log off a student computer on campus, you should not turn off the computer.

One important exception to the universality of your UID/password for logging on to campus computers is the Math Department computer system, <http://www.math.utah.edu/ugrad/lab.html>. All students taking Math courses are assigned a Math Department login name and initial password that are NOT the same as their UID and University password. The undergraduate walk-in computer lab is located in the Rushing Math Student Center, located underneath the plaza connecting JWB to LCB. There is also a computer classroom in LCB 115, where some introductory tutorials are held. Useful information about most aspects of the lab can be found by following links from the Math Department web pages like the one above, or the precursor directory <http://www.math.utah.edu/ugrad>.

If you're working on the Math Department system *your login name* will be of the form c-azbc, where 'az' is first letter- last letter of your last name, and 'b','c' are your first, and middle initials, respectively. For example, if your name is Ulysses Attila Eratosthenes, your login name will be c-esua. (Many people have the same initials, so to ensure your login name is unique, a digit may be added after the initials, eg. c-esua1, c-esua2, ...). For people with more complex (eg. hyphenated names) only the first character of each name is used.

Your *initial password* will be the letters as in the login name, followed by the last four digits of your University ID number (e.g., if your UID is 123456789 and your login name is c-esua, then your password is esua6789) or if the login name is c-esua2 the password is still esua6789). You should *change your password* if it's still the default one. To do so, log in, open a terminal window using a mouse or icon selection (depending on the operating system you've logged on with), then type "passwd" (followed by RETURN/ENTER). Ask a lab assistant how to do this if you're doing this tutorial on your own and are confused.

If you previously took a math class and used our system then your old account may still be active, with the last password you used. If all your efforts to log on fail, ask a lab assistant for help.

Don't forget to log out when you're done. Never turn off a Math Department computer.

2) Opening Matlab

Matlab may appear as icons on your computer desktop and perhaps the icon will contain a picture of the "MathWorks" logo. Alternately, you may open Matlab with a terminal window command or by searching directories. If you're not sure how to find and open Matlab, ask a lab assistant. In Marriott if you can't find a class software or applications directory with Matlab in it, ask at the help desk.

3) Using Matlab

If you are starting the tutorial at this point, we assume you have already opened Matlab.

Matlab is partly just a very fancy calculator; it can do practically any undergraduate mathematics computation. Additionally, in Matlab you can write programs, create plots, save large amounts of data, customize how you want the program output to appear on your screen, and much more.

Demo Videos for New Users

When you open Matlab you can find a series of demo videos by going to the "Help" menu and selecting "Demos". It is recommended that you watch the first three videos in this list to help you get started in Matlab. This is a good way to learn generally about what Matlab can do. If you wish you can explore now, or you can continue with the Math 2250 notes below and come back to the demo videos later.

Matlab Window

On opening Matlab, you will notice that the window is broken up into several sections. On the left column, there is a Directory Section titled "Current Folder" which displays all the files and folders in the current directory, and just below that is a Description Section which gives further details about the file that is selected in the Directory Section. For the time being, we will ignore these two sections on the left hand side of the window.

In the center of the window is the largest section titled "Command Window". This is the only section that we will be concerned with during this introductory tutorial. You will notice that in this window there may (or may not) be some text written at the top which gives some details about the version of Matlab you are using. Below this text is the command prompt, ">>", which is where you will type in the Matlab Commands described below. You should see your cursor blinking next to the command prompt.

On the right column, there is a section titled "Workspace" which shows a list of all the variables that have been defined in the current Matlab session and gives some basic details about them. The section directly below this one is entitled "Command History" which shows, in reverse order, all previous commands entered into Matlab at the command prompt. For the time being, we will ignore these two sections on the right hand side of the window.

Entering Matlab commands

Focusing on the "Command Window", make sure that your cursor is blinking in front of the first command prompt, which is denoted with a ">>" symbol. After typing a command and pressing "Enter" on your keyboard, you should see the output of the command and then a new command prompt below, again denoted by the symbol ">>". If you wish to suppress the output after any command, simply make sure to type a semicolon after at the end of the command before pressing Enter. If you want to enter multiple commands at the same command prompt,