

VMI-Specific MATLAB Text Supplement

Chapter 1

How to obtain and install Matlab

Matlab is available on the desktop of every lab computer in the Department of Electrical and Computer Engineering in NEB 404, 426, and 428, so you do not need to install it on your personal laptop. If you want a personal copy, take your laptop to the Barracks Help Desk (inside the Barracks Study Room, across from the VMI Post Office, open weekdays 0700-1600) and have it installed for free. This is a remarkable deal; I had to purchase a private copy for my consulting work, identical to the VMI version, for \$2,500.

If you need access away from VMI and you didn't first install it using the above instructions, you must first register with Mathworks (<https://mathworks.com>, person icon in top right), then install it on your laptop no matter where in the world you are here: <https://vmiengineering.github.io/Software/matlab>. In a pinch you can access a stripped down version that is entirely web-based at <https://matlab.mathworks.com/>, although this version will have various limitations that make it less ideal than the full version.

MATLAB, toolboxes, Simulink, and blocksets

If you decide to install MATLAB on your laptop, be aware that it is actually a family of products that currently includes over 30 add-ons called "*toolboxes*", a separate simulation program called "*Simulink*" and over a dozen add-ons to Simulink called "*blocksets*". VMI has licenses to use all of them. Ask the helpdesk not to install anything other than Matlab until you have finished this class, otherwise it will swell the size of your installation and clutter your help searches by over a factor of ten, effectively hiding the information you want to find in unrelated hits.

Practice problems

Do the class problems either on your own before you come to class or during class. The more work you do before class, the more you can concentrate on working the lab problems. Do the class problems in a Microsoft Word document. For every class problem followed by a © symbol, write the Matlab command that solves the problem into the Word document. An ® symbol means to write the result that Matlab returns into your Word document. Do not re-type anything; cut-and-paste the command or result.

Lab problems

These problems require more thought than the Practice Problems that were designed to check general comprehension. Create a Word document for your answers. For each question, record the Matlab command if there is a © next to the problem, and the Matlab result if there is a ® next to the problem. Example of a question and answer with both a ©® requirement:

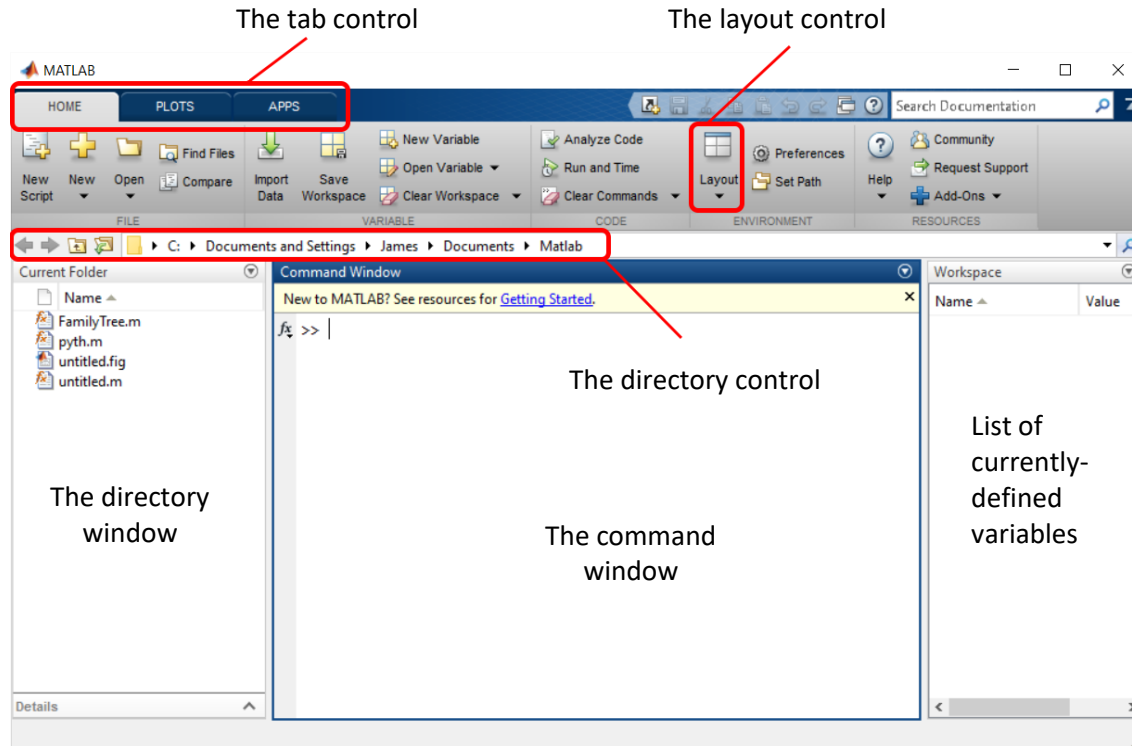
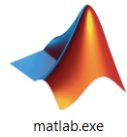
Question: Use Matlab to evaluate $4 + \sqrt[6]{5}$ ©®

Answer: Command: `4+(5^(1/6))`
Result: 5.3077

Notice how neat this is. You can often get your entire lab to fit on two pages. **Students who cut and paste leaving large amounts of blank space, extraneous work, and mistakes will earn a lower score**, just as an industry partner would find a messy report less useful than a short, clean report.

Starting MATLAB and the workspace

The MATLAB program icon is shown to the right. It may take a minute to load, especially if the installation includes many toolboxes or if this is the first time it is run. Matlab will open its standard workspace as shown below.



MATLAB is composed of several controls and windows. The most important window is the center “command” window, into which all Matlab commands are entered.

If the MATLAB environment looks substantially different than the image above, set the tab control in the upper left to HOME and choose DEFAULT from the dropdown layout control in the upper toolbar. Keep the tab control in the HOME position; the other positions offer various wizards, for example to assist in plotting or filter design, that tend to be more cumbersome to use than learning the direct syntax, as is described in this text.

Next, create a data folder and make it MATLAB’s current **working directory**. This is the directory in which Matlab expects to find the user’s data and programs.

- 1) Locate the directory control in the toolbar at the top left of the MATLAB main window.
- 2) Navigate to your personal directory on the network. This will be on the M drive.
- 3) Inside your personal directory, create a new subfolder called EE120.
- 4) Inside that folder, create a subdirectory called Chapter1.
- 5) Note that the Current Directory type-in box in the toolbar now points to your Chapter1 directory.