

How to use MATLAB from home

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1 Introduction

To solve most of the exercises of this course, you need MATLAB, a high-level language and interactive environment for numerical computation, visualization, and programming. MATLAB is very intuitive and it is suggested to users that do not have experience in programming. On the other hand it is very expensive (105€ only for the basics software without the toolboxes) and you can download from www.mathworks.com/products/matlab/ only a free 30-day trial version.

In this guide we are going to explain to you the several solutions to solve the exercises without the need to purchase a license.

2 Solution 0: Go to the library

This is the simplest and most obvious solution to solve the exercises, to use the computers of the library. You should already have an active account, if you don't, contact as soon as possible Luca or Stevan by email. If you need the key to access the library, come to the office 35.17 and ask the key to Luca, Stevan or Francesca.

3 Solution 1: Work from a remote host

The second solution is to work with your personal computer and to connect to the library pool by "ssh", a network protocol to connect to remote terminal.

3.1 Start a ssh session

3.1.1 For Mac and Linux users

If you have a UNIX (or UNIX-like) system, you just need to open the terminal and to use the following command to connect to the library:

```
ssh username@pool01.chemie.fu-berlin.de
```

and after you have inserted the password, you can use the terminal like if you were in the library. You can also add **-X** after **ssh**, to enable the Graphical User Interface (GUI) (but we will discuss this command later).

3.1.2 For Windows users

If you use a Windows system, you do not have a UNIX terminal, so you have to install an emulator. The best choice is PuTTY, together with Xming:

- PuTTY: this is the terminal emulator. You don't need to install it, the program can be run by just clicking on the icon.
You can download from <http://the.earth.li/~sgtatham/putty/latest/x86/putty.exe>
- Xming: this gives you a GUIs. When you are going to install it, choose "custom installation" and select the "Don't install an SSH client" option.
You can download from <http://sourceforge.net/projects/xming/>

Now that you have both the programs, you have to run Xming and then PuTTY (Xming must be running before you run PuTTY!). Then you have to setup PuTTY:

1. In the box below Host Name (or IP Address) type **pool01.chemie.fu-berlin.de** and select **SSH**.
2. (optional) Click the **[+]** to expand SSH from the window on the left, click on **X11** and select the checkbox for enable X11. This option enables the GUI (it is like to add **-X** after **ssh** for Unix systems), but we will comment this later.
3. You can save the session (so you do not need to setup everything everytime). Scroll the left hand window back to the top and click on the Session heading. In the Saved Sessions box, type "Matlab on fu-library" (or any other name you would like to give it) and click on the **Save** button.
4. Finally, click **Open** to start the terminal.

3.2 Start a MATLAB session by ssh

Now, independently on your system, you should be able to access to the library terminal and you are ready to start MATLAB, but depending on your internet connection, you have to decide if to use the graphical interface or to use MATLAB from the terminal.

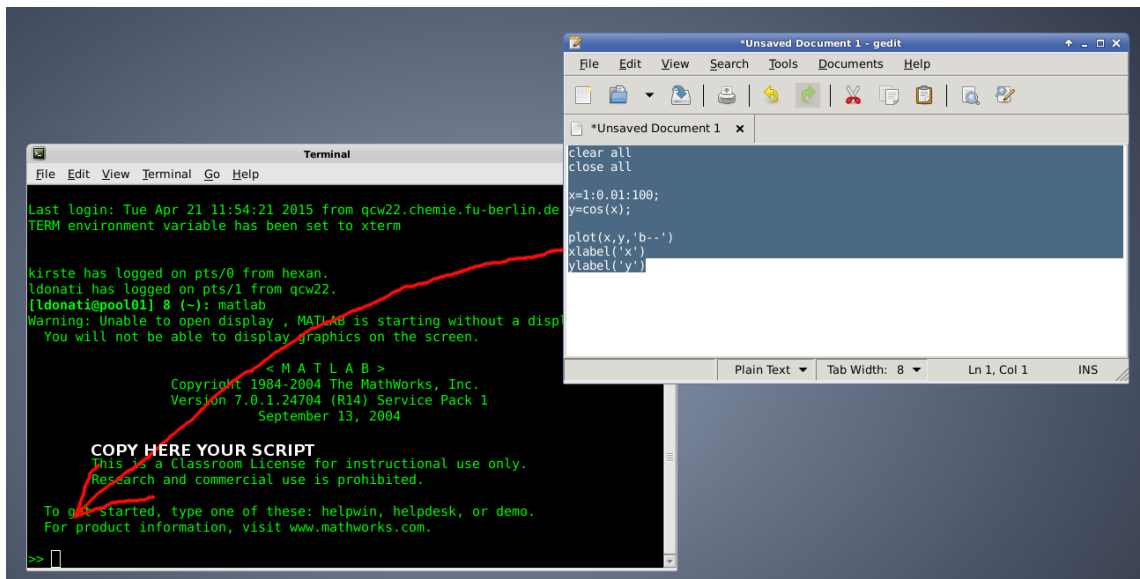
3.2.1 For high-speed internet connection

If you have a good internet connection you can use the graphical interface exactly like if you were in the library. When you connect by ssh, add **-X** after **ssh** (or enable X11 if you are using PuTTY). Finally write **matlab** in the terminal, to start the program as usual.

3.2.2 For slow internet connection

If you do not have a good internet connection, the MATLAB interface can be very slow and it could crash. If this is your case, DO NOT add **-X** after **ssh** (or DO NOT enable X11 if you are using PuTTY).

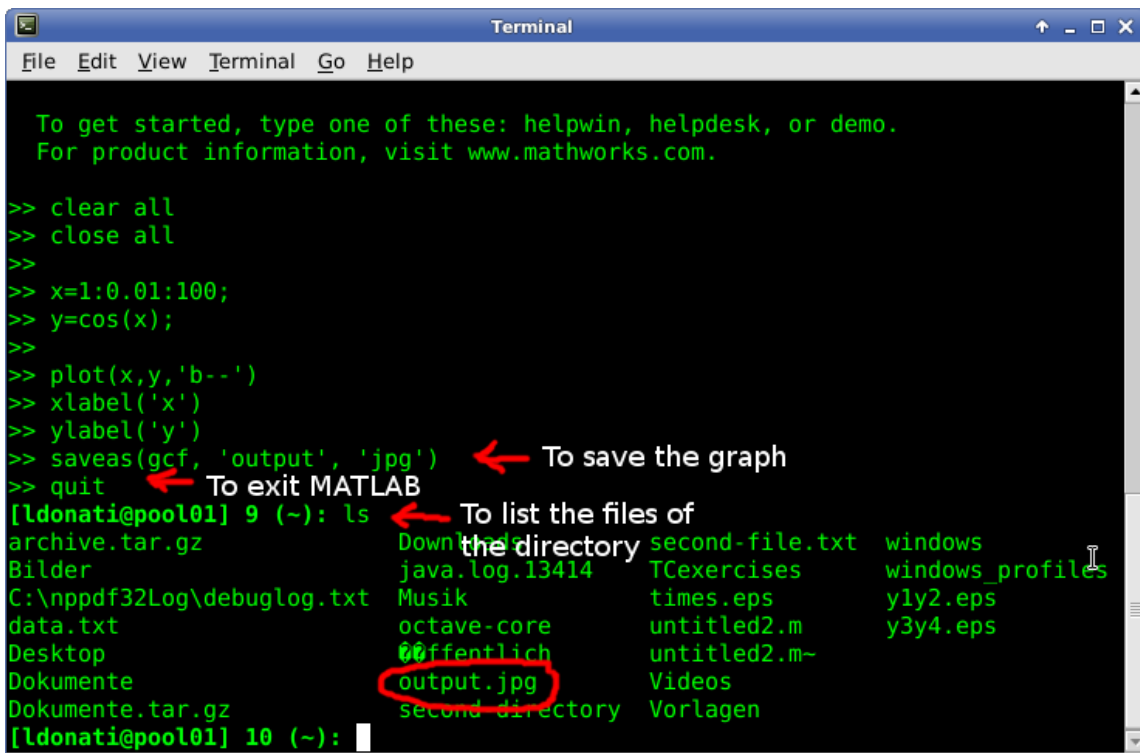
To start MATLAB, type **matlab** in the terminal as usual, but in this case the interface will not open and you have to type your MATLAB script directly in the terminal. Because you cannot use the MATLAB editor, this procedure can be uncomfortable, so I suggest you to open the text editor of your system (like notepad if you are using Windows), write down your script and only at the end copy-paste everything in the terminal, like in the below figure.



Of course, if you try to plot something (like in the above example), you cannot visualize the graph (because the GUI is not active!), but you can save the picture with the command:

saveas(gcf, 'output', 'jpg')

that saves the plot in the directory (of the library) from where you started MATLAB.



3.3 Transfer files from the library to your computer

3.3.1 For Mac and Linux users

In both cases, i.e. if you are using MATLAB with a GUI or with the terminal, when you save a file (a script `.m` or a graph), you are saving it in a directory of the computer library. If you want to move files from the library to your personal computer in a local directory, you need to quit the ssh session (with the command `exit`) and to use the command `scp` as follows:

```
scp username@pool01.chemie.fu-berlin.de:/remote-directory/file.ext /local-directory
```

If you want to move a folder, just add `-r` after `scp`:

```
scp -r username@pool01.chemie.fu-berlin.de:/remote-directory/folder /local-directory
```

3.3.2 For Windows users

PuTTY is not enough to move files from a remote to a local host, you need to install another software to use the service SCP, like:

- WinSCP: <http://winscp.net/eng/index.php>

The installation and the configuration of this program is quite trivial. When you open it for the first time, you have just to type the hostname **pool01.chemie.fu-berlin.de**, your username and password. After starting the session, you can see on the left the directories of your personal computer and on the right the directories of your library computer. To move files from a computer to the other, just drag them with the mouse.

4 Solution 2: work with GNU OCTAVE

The last solution is to use OCTAVE instead of MATLAB. OCTAVE is a programming language mostly compatible with MATLAB. The most important advantage respect to MATLAB is that it has a free licence and then you can download and install it on your personal computer for free. This means that you do not need to connect to the library and that you can work offline. The syntax is 99% equal to MATLAB. If you need a MATLAB function that does not work in OCTAVE, just use google to find out a solution.

In the beginning OCTAVE was just a command-line application, but with the last releases you will get a nice graphical interface similar to the MATLAB one with a text editor included.

You can download GNU OCTAVE from here <https://www.gnu.org/software/octave/>.

If you are using windows, the section of the website "Octave for Microsoft Windows" is not very clear. Go directly in the subsection "Octave with Visual Studio" http://wiki.octave.org/Octave_for_Microsoft_Windows#Octave_with_Visual_Studio, download the runtime libraries (but maybe you already have in your system) and then download the last version 3.6.4 http://wiki.octave.org/Octave_for_Microsoft_Windows#Octave_3.6.4.

5 Final remarks

Hopefully, with this guide, you will not have any problem working at home, but if you face obstacles with the use of the cited software, you can write to Luca or Stevan by email and we will be glad to help you. You can also come at our office (35.17) with your laptop and we will try to find out a solution to your problems.