

Economics 520, Fall 2005

Notes on Using Matlab and Octave:

For the computational parts of the homework, you should use Matlab or Octave. Matlab is a commercial scientific software package, and is available on the university u-system. It can be purchased for your own personal use, but is rather expensive for the full-featured version. (I do not recommend the student version of Matlab as it has some major limitations.)

Octave is a free (GPL-licensed) program with very similar syntax to Matlab; the same program will usually work with minor modification on either Matlab or Octave. For our purposes, either is fine. You may wish to install Octave on your home computer/laptop and use Matlab at school.

In this note are instructions on how to:

1. Get a u-system account if you don't already have one
2. Access Matlab on the u-system from the economics graduate lab
3. Access Matlab on the u-system from your own computer
4. Install and run Octave on your own computer
5. Transfer files to and from the u-system

I provide information for users of Linux, Mac OS X, and Microsoft Windows. Please note that since I don't use Windows myself, I cannot provide much further information about Windows-related issues. (I have verified that access to the u-system from the economics graduate lab computers works fine.)

1 U-System Account

General information about the u-system can be found at:

<http://www.u.arizona.edu/>

You should have a UA NetID (<https://netid.arizona.edu/>), then add a u-system account at <https://account.arizona.edu/>

When you first log in to the u-system, you will be presented with a choice between using the menu interface and the shell interface. To use matlab you want to be in the shell interface. If your account is set up to automatically put you in the menu interface, follow these directions to change to the shell:

<http://consult.web.arizona.edu/menu2shell.html>

2 Accessing Matlab on the U-system from the Economics Graduate Lab

Note: if you are planning to access the u-system from your own computer, please read this section anyway as it contains some useful information.

I recommend you first try a non-graphical session, then move on to a graphical session only if you need it. Graphical sessions can be slow depending on the speed of the network connection.

2.1 Non-graphical session

1. Click on the **Start** Button, and find the **Secure Shell Client**.
2. Click **Quick Connect** on the Secure Shell Client window. This will call up a window that asks for the following information:

```
hostname: u.arizona.edu
username: <your username on the u-system>
port #: 22
authentication method: password
```

Enter this information and proceed to log in.

3. After logging in to the u-system, make sure you are in the shell (not the menu), and type `setup matlab14` at the prompt (you will only need to type this the first time you try to start Matlab). Then type `matlab -nojvm` at the prompt. This should start up a session that looks like this:

```
> matlab -nojvm
```

```
          < M A T L A B >
    Copyright 1984-2003 The MathWorks, Inc.
    Version 6.5.1.199709 Release 13 (Service Pack 1)
          Aug  4 2003
```

```
Using Toolbox Path Cache. Type "help toolbox_path_cache" for more info.
```

```
To get started, type one of these: helpwin, helpdesk, or demo.
For product information, visit www.mathworks.com.
```

```
>>
```

At the prompt, you can start typing in commands.

2.2 Graphical Session

The following instructions are based on the information in

<http://www.u.arizona.edu/udocs/display.html>

1. First, we need to make sure eXcursion is correctly configured. Click **Start**, go to **All Programs**, find **eXcursion**, then **Control Panel**. Or, if eXcursion is running, find it on the taskbar and right-click it and choose **Control Panel**.
2. Click the **Display** tab and set **Multiple Windows**.
3. Click the **Access** tab. Check the **Enable Access Control** box.
4. In the access tab, check to see if “TCPIP localhost *” and “TCPIP u.arizona.edu *” are listed under “Existing Nodes.” If they are not, then under Node Name add “localhost” and click the Add–j button, then add “u.arizona.edu” under Node name.
5. Click **Apply**, then the **Start/Restart Server** button at the bottom of the eXcursion Control Panel. Hosts
6. Start **SSH Secure Shell** but do not actually connect yet. You need to define an SSH Profile for your connection.
7. Under the **Profiles** pulldown, select **Add Profile**. Enter a name for your profile, such as <yourname>@u-sys.
8. Next, under the Profiles pulldown, select **Edit Profiles**. Select the profile name you just created, and in the Connections tab make sure that the Host Name is set to **u.arizona.edu** and the User Name is set to your username. Then click the **X11 Tunneling** tab, and check the **Tunnel X11 connections** box.
9. Finally, save the changes, and use the Profile pulldown to select the Profile you have just named and configured. Enter your password when prompted.

If all goes well, you should be logged in to the u-system. To test if X is working, try typing `xclock &` at the prompt. This should pop up a graphical clock window.

Next, at the shell prompt, type

```
matlab -nojvm
```

This will start a matlab session with graphics. You will see the same screen as in the nongraphical session. Try typing the following commands at the `>>` prompt:

```
>> x=randn(100,1);  
>> plot(x)
```

This should pop up a new window labelled “Figure No. 1” with a graph in it. (There may be a slight wait for the window to pop up.) That indicates that the graphics are being exported to your local display. To quit, type `quit` at the `>>` prompt.

Alternatively, you can use a java-based matlab session, by typing `matlab &` from the shell. I don’t recommend using this mode as it seems to be very slow.

3 Accessing Matlab on the U-system from your own computer:

In order to access Matlab on the u-system you need an SSH client (for terminal sessions) , an SFTP client (for file transfer), and optionally, an X client (for graphical output).

3.1 Linux

You already have SSH, SFTP, and X. Open a terminal window, and connect to the u-system using `ssh -l <username> u.arizona.edu` for a non-graphical session, or `ssh -X -l <username> u.arizona.edu` for a graphical session. Here `<username>` is your user name on the u-system. Once you are logged in, follow the instructions from Section 2 to set up and start Matlab.

3.2 Mac OS X

You already have SSH and SFTP. X11 is an optional part of Mac OS X, and can be installed from your system disks, or downloaded from

<http://www.apple.com/macosx/features/x11/download/>.

For non-graphical access, you don't need X11. Open the terminal application, which is in the Applications: Utilities folder. Type `ssh -l <username> u.arizona.edu` where `<username>` is your username on the u-system.

For graphical access, first click on the X11 application, which is in Applications:Utilities (assuming you have installed X11). You may have a choice of "rootless" or "fullscreen" mode. Either is fine, but "rootless" is probably easier to work with. This should start up an xterm window. In the window, type: `ssh -X -l <username> u.arizona.edu`.

3.3 Windows

You need to install SSH, SFTP, and an X client.

1. For SSH and SFTP, see the instructions at:

<http://consult.web.arizona.edu/win-ssh.html>

2. For the X client, I recommend eXcursion, which is available free for University members at: <https://sitelicense.arizona.edu/excursion/excursn.shtml>

Then see

<http://www.u.arizona.edu/udocs/display.html>

for information on how to use "eXcursion with SSH tunneling."

4 Installing Octave

4.1 Linux

Octave comes standard with most distributions of Linux. Try typing `which octave` in a terminal window and see if it returns a program with that name. If it doesn't, you may need to install it from your system install disks, or download it from www.octave.org.

4.2 Mac OS X

Octave is available as part of the Fink packaging system.¹ You will need to

1. install X11 (see Matlab notes above)
2. install Fink, including the Octave package.

To install Fink:

1. Point your web browser to <http://fink.sourceforge.net/>, and follow the “download” link to download the Fink binary installer. You should end up with “Fink Installer dmg” on your desktop.
2. Click on Fink Installer dmg. This will install the Fink disk image
3. Click on the disk image, and then click on the Fink ## Installer.pkg to run the installation program.
4. After this is done, copy the Fink Commander folder from the Fink Installer disk image to the Applications directory. Open it and click on Fink Commander.
5. First, go to the “binary” menu and select “update descriptions.” Then, scroll to the 'fink' package in the main window, make sure it says 'current' If not, select fink, then from the menu select binary: install.
6. Once that is done, find the octave package. Select this, then binary: install
7. Quit Fink commander.
8. Start X11, and in the xterm window, type `octave` at the prompt.

4.3 Windows

See the instructions at:

http://octave.sourceforge.net/Octave_Windows.htm

¹The Fink system provides easy access to many standard Unix programs, and will be useful if you intend to do any serious scientific computing on your Mac.

5 Transferring Files

At some point you will probably want to transfer files, such as m-files and diary files, to and from the u-system. The best way to do this is to use `scp` (secure copy) or `sftp` (secure file transfer protocol). Some general information on how to do this is available at:

<http://www.u.arizona.edu/udocs/access.html>

Here are some simple ways to transfer files:

- In Linux or Mac, open up a terminal window. Type `sftp <username>@u.arizona.edu`. When prompted, enter your password. Once you are logged in, you can use
`put <filename>`
to transfer a file to the u-system, and
`get <filename>`
to download a file from the u-system to your own computer. You can also use wild-cards; for example, the command `get *.m` downloads every file that ends in `.m`. Other useful commands are `cd` to change directories, and `lcd` to change your local directory (the directory on your local machine).
- Windows: please see
<http://consult.web.arizona.edu/win-tnl.html>