

Handed out August 30, 2000
 Due back September 6 2000
 Introduction to Matlab

Matlab (<http://www.mathworks.com>) is available on the UNIX workstations at CFAR and UMIACS, on some PCs in labs and on the PCs in the Jasmine Laboratory (Room 2446 A.V. Williams)

A color postscript printer is available in Room 2109 A.V. Williams and is accessible from UMIACS and CFAR machines.

Spend an hour playing with Matlab.

- Use the following help commands:
 - 1) help inside the program : E.g. `>> help edge`
 - 2) pdf help files (either on the web or locally)
<http://www.mathworks.com/access/helpdesk/help/fulldocset.shtml>
 UNIX: `/usr/imports/matlab/help/techdoc/pdfdocs`
 PC: `C:\MATLABR11\help\pdf_doc`
 - 3) html help (type `helpdesk` inside the program)
- See the demo of Matlab and the image processing toolbox by typing
`>> demo`
- Figure out how you can print homework output and results from Matlab

M files are Matlab scripts or functions. You can see the contents of Matlab's built in functions by using the command `type`, e.g. `>> type edge` to see how the edge finding function is implemented

It is a good idea to do most of your work in a script file so that you can avoid a lot of typing.

For the homework problems below you will need to submit script/function files and figures (if required).

1) Create random vectors 'a' and 'b' of length 10 and a square matrix 'A' of dimension 10 × 10 by using the `rand` command.

`a=rand(10,1)`, etc.

Execute the following commands

`a*b` `a.*b` `a/b` `a./b` `a*b'` `a\A`

Explain what these commands do

2) Colon notation

Execute the following commands

`1:10` `a(1:5)` `a(4:9)+b(1:6)` `0.1:0.1:100`

Explain what these commands do

3) Boolean variables

Execute

```
bga=b>a
Ib=find(bga)
b(Ib)
```

what do you get? Explain the results of the three commands.

4) Image:

Create a random gray level image I (elements in the range 0-255) of size 256x128 using the rand command. Convert this image to type uint8. Display it using the commands

```
image(I)
imshow(I)
```

What differences do you see?

5) Function:

Write a function that will return the roots of a general quadratic equation given the coefficients of the equation. Make your program as general as you can.

6) advantage of vectorization

For problem 3, write a function that explicitly uses for loops to achieve the same result.

7) Finally a bit of fun

Execute

```
>>bench(20)
```

and submit the results you get.

Also write down the type of machine you executed the command on (by hand) on your output.

Remember: Print out your images and any script files for all these problems and submit them.