

Computer Lab Assignment 1

Introduction to Matlab

Start Matlab and type the following in command window.

(1) Define variables: try the following lines (Find two errors!)

```
>> a=6
>> a=6;
>> b=19
>> b=19.8
>> c = a*b
>> d = sin(c)
>> e = 'The quick brown fox'           (must use the right type of single quotes in Matlab!)
>> f = [e ' jumps over the lazy dog. ']
>> f = d+E
>> 2g = 2*f
```

(2) Define *row* and *column* vectors. What is the difference? (Find 2 errors!)

```
>> c = [2 4 6]
>> r = [3;5;7]
>> c(3)
>> c(2) = r(3)*2
>> size(c)
>> rank(c),rank(r)
>> norm(r)
>> c(3)
>> c*c
>> r*r
>> c*r
>> r*c           (What is the difference between r*c and c*r ?)
>> c=5           (What is the difference between this and the following line?)
>> r(:) = 10
```

(3) The colon operator ":"

```
>> 1:10
>> 1 : 0.5 : 10
>> 100 : -7 : 50
>> r(1:2)
>> r(:)
```

(4) Make a 2D plot (copy and paste the following lines)

```
x = 0:0.01:1
y = sin(10*x)
plot(x,y)
xlabel('X Axis')
ylabel('Plot Y Axis')
```

```
title('My first X-Y graph')
```

Make an improved XY plot:

```
x = 0:0.01:1
y1 = sin(10*x);
y2 = sin(5*x);
plot(x,y1,'r+',x,y2)
xlabel('X Axis')
ylabel('Y Axis')
title('My second X-Y graph')
plot(x,y1,'r+',x,y2,'r:')
plot(x,y1,'r+',x,y2,'-o')
```

(What is the difference of the last two lines?)
→ Now save the graph as a PNG file (menu file→save)

(5) Define a matrix

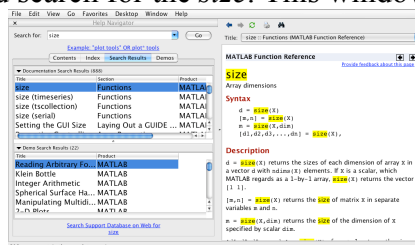
```
>> v = [1 2 3]
>> v2 = [v v v]
>> v3 = [v,v,v]
>> M = [v;v;v]
>> A = [16 3 2 13; 5 10 11 8; 9 6 7 12; 4 15 14 1]
```

Before typing it guess the following two lines should print:

```
>> A(1,2)
>> A(1)

>> A'
>> A(1:4,1)
>> A(2,:)
>> size(A)
```

(6) Open the HELP window and search for the *size*. This window should look like:



```
>> sum(A(1:4,end))
>> B = zeros(5,4)
>> size(B)
>> size(B,1)
>> B(:, :) = 10
>> B = 10
```

Delete the second column with

```
>> A
>> A(:,2) = []
```

(7) Make a 3D plot

```
[X,Y] = meshgrid(-8:.5:8);  
% What does meshgrid do? Investigate X and Y!  
R = sqrt(X.^2 + Y.^2) + eps;  
Z = sin(R)./R;  
mesh(X,Y,Z, 'EdgeColor', 'black')  
surf(X,Y,Z)  
colormap hsv  
colorbar
```

Now rotate the 3D graphics with the mouse. Now save the graphics as PNG file (file→save)

(8) Make a contour plot (containing lines of constant altitude) of the predefined functions peaks;

```
[x,y,z] = peaks;  
pcolor(x,y,z)  
shading interp  
% do not erase this -- add contour lines to existing graph  
hold on  
contour(x,y,z,20, 'k')  
hold off
```