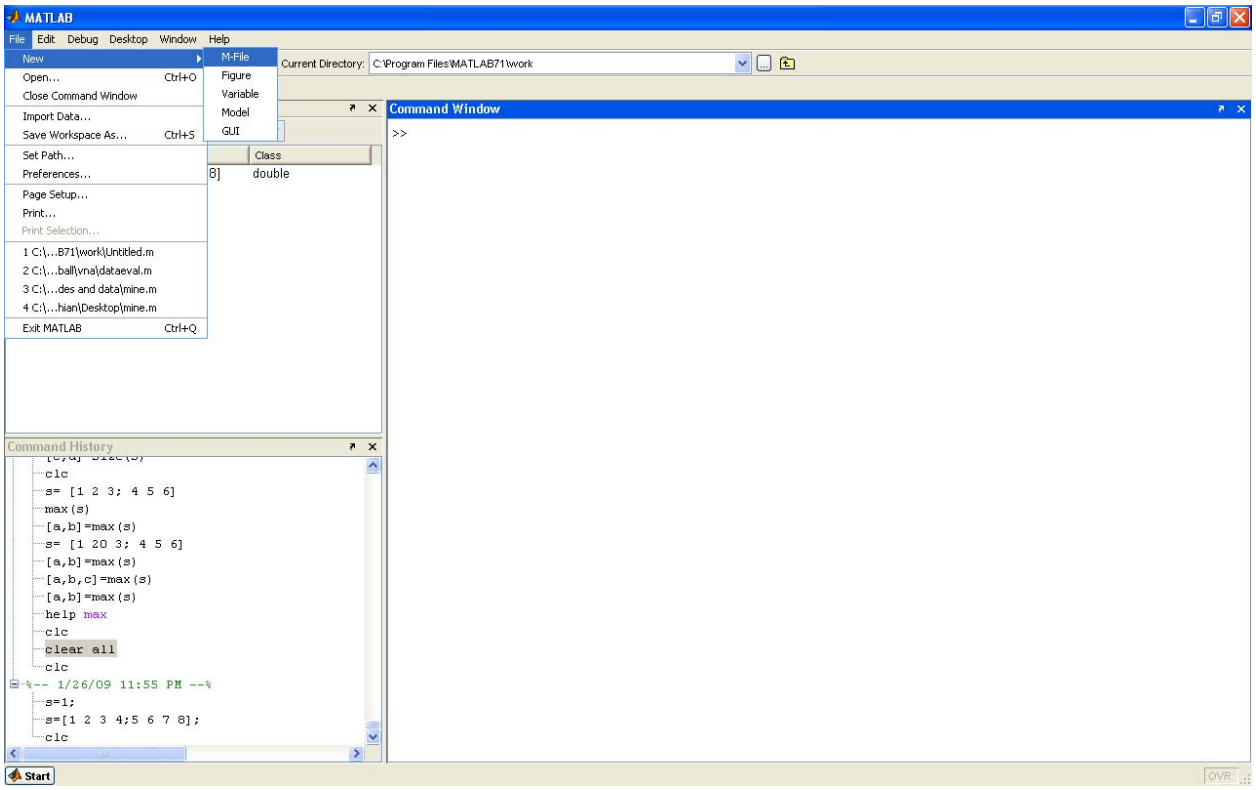
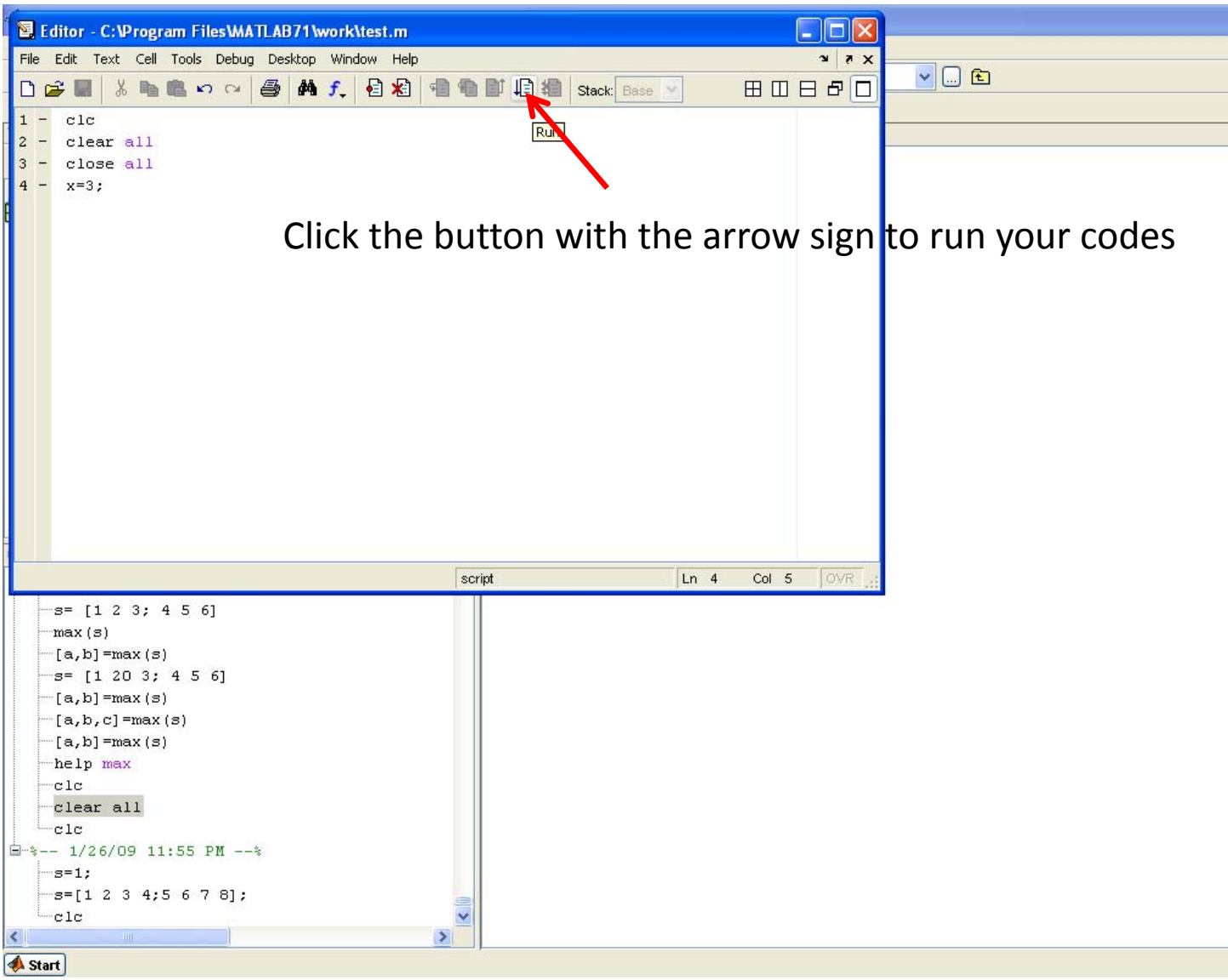
Matlab Tutorial
Winter 2012
ME 610

1) First click on the file menu and then click on new button to create an mfile for your code



2) Save the file and make all the changes



3) You can then run the code by clicking the arrow shown in the above

Here are a few popular commands in MATLAB, you can find other commands using the help command in the command window or the index directory in MATLAB.

% The line following this sign will not be read in the m file

clc %clears the command window

clear all %clears all the variables

whos % checks for any assigned values and available data in the workspace

```
x=10;                %assignment of variable

n=1:10;              %assignment of array
n=1:0.01:10;

m=[1;2;3];           % assignment of a column vector

m=[1 2 3];                % assignment of a row vector

m=[1 2 3;4 5 6];          % assignment of a matrix

a=d/2;   %division

a=b+c;  % summation

a=b*d;   % multiplication

a=b-c;   % subtraction

imag();  % imaginary value for a complex number

real();  % real value for a complex number


a=[1 2 3]; a' % gives the transpose of a vector

abs()   % magnitude of a complex number or the positive value (abstract) for a real
number

mean(w)  %mean value for the elements of a vector or each columns of a matrix

std(w)   %the standard deviation for a matrix

std(w,0,1) %gives the standard deviation along the column and std(w,0,2) gives the
standard deviation along the row.

sqrt(x) % gives the square root

eye(n,n) %identity matrix of size 'n'
eye(n)

zeros(n,n)  % zero square matrix of size  'n'
zeros(n)
```

```
for i=1:10
j=i+1;                % writing a loop command
end
```

```
s=[1 2 3; 4 5 6; 7 8 9]; [a,b]=size(s);   % gives the size of a matrix
```

```
[a,b]=max(x);   % gives the maximum entry for each column if a matrix and the number of row for which this entry belongs to
```

```
s(n:n+p,m:m+k);  %gives the rows of n to n+p and columns of m to m+k of a matrix
```

```
s=w.^2;  %takes the entries of a matrix and squares each of them and assigns to a new matrix s
```

```
s=a.*b;  % multiplies each element one by one for two matrices
% note: in general when you have dot before each of the multiplication, division, subtraction and summation sign it means that the operation will be performed one to one of the elements of two arrays or matrices
```

```
p(:,n)  % returns the column 'n' for a matrix
p(n,:)  % returns the row 'n' for a matrix
```

```
fliplr(x)  %    returns x with row preserved and columns flipped
```

```
wb=interp1(mag2sec,freq2sec,Hb);
```

```
figure  % opens a figure
```

```
subplot(2,1,1) ,plot(t,f1)  % plots this figure as a subplot
```

```
subplot(2,1,2) ,plot(t,f2)   % plots this figure as a subplot
```

```
semilogy(x,y)      % creates a logarithmic plot for the y axis  and linear scale for the x axis
```

```
loglog(x,y)              % creates a logarithmic plot for both x and y axis
```

```
SYS = SS(A,B,C,D)          %creates a state space system
```

```
Impulse (sys)              %creates the results for the impulse response of a linear system
```

```
Step (sys)                 %creates the step response for a linear system
```

Check also

step([1],[1 2])
impulse([1],[1 2])

plot(x,y) % plots ‘y’ with respect to ‘x’

title('Force') % assigns title to the figure

xlabel('time (sec)') %assigns label to the x axis

ylabel('Force (N)') %assigns label to the y axis

legend('L1','L2') % gives legend to the figure contains more than one set of data

close all % closes all the figures

hold on %keeps a figure open to plot the second one on the same figure

load a %loads the variable a
save a % saves the value of variable a in the mat format (you will see the a.mat in the workspace of your current directory)

file.m

%this is not a command the textfile (your code) can be saved under a name called file and with extension m and you can run it by opening the file in the current directory and clicking on the run arrow

sin (x) % takes the sin of an arc (in radians)
cos (x) % takes the cos of an arc (in radians)
tan (x) % takes the tan of an arc (in radians)
cot (x) % takes the cot of an arc (in radians)
atan (x) % takes the arc tangent for an x value
atan2 (y,x) % gives the four quadrant arctangent of the real parts of the
  elements of x and y (y is related to the ‘sin’ and x is related to the ‘cos’)

diff(w) % gives the difference between two adjacent element in an array (helps with differentiations)

```
[V,D]=eig(A)   % gives the eigenvalues and eigenvectors
```