Lab # 1

MATLAB Basic operation and implementation

Objective:

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Resource Required:

Introduction

MATLAB is a computer program that combines computation and visualization

power that makes it particularly useful tool for engineers. MATLAB is an executive program, and a script can be made with a list of MATLAB commands like other programming language. MATLAB stands for MATrix LABoratory. The system was designed to make matrix computation particularly easy.

The MATLAB environment allows the user to:

- manage variables
- perform calculations
- generate plots
- import and export data
- develop and manage files for use with MATLAB

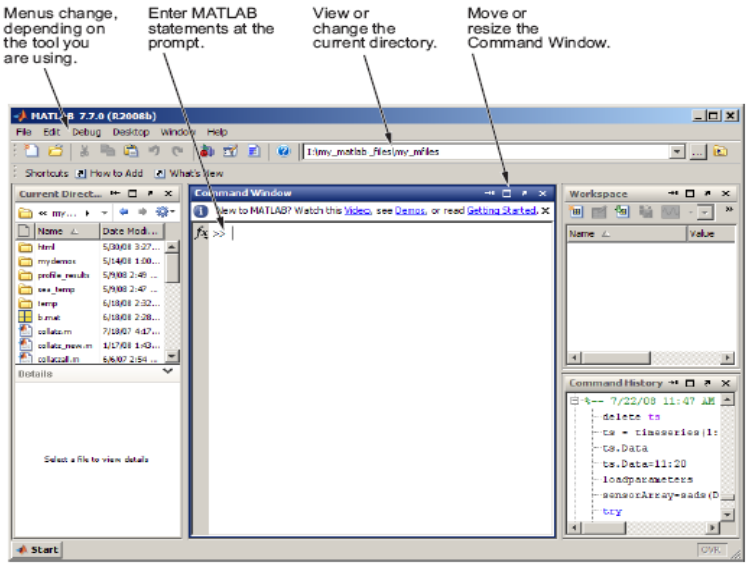
Display Window:

a) Graphic (Figure) Window:

- Displays plots and graphs
- Created in response to graphics commands.

b) M-file editor/debugger window:

- Create and edit scripts of commands called M-files



Getting Help:

Type one of following commands in the command window:

- help – lists all the help topic
- help topic – provides help for the specified topic
- help command – provides help for the specified command
- help help – provides information on use of the help command
- helpwin – opens a separate help window for navigation
- lookfor keyword – Search all M-files for keyword

Variables:

a) Variable names:

Must start with a letter

- May contain only letters, digits, and the underscore "_"
- Matlab is case sensitive, i.e. one & OnE are different variables
- Matlab only recognizes the first 31 characters in a variable name

b) Special variables:

1. ans : default variable name for the result

2. pi: $\pi = 3.1415926\ldots\ldots\ldots$

3. eps: $\varepsilon = 2.2204e\text{-}016$, smallest amount by which 2 numbers can differ.

4. Inf or inf : ∞, infinity

5. NaN or nan: not-a-number (for expressions which have undefined numerical results)

c) The : operator

- VERY important operator in Matlab
- Means 'to'

```
>> 1:10

ans =

   1    2    3    4    5    6    7    8    9   10

>> 1:2:10

ans =

   1    3    5    7    9
```

Subscripts

The element in row i and column j of A is given by A(i,j).

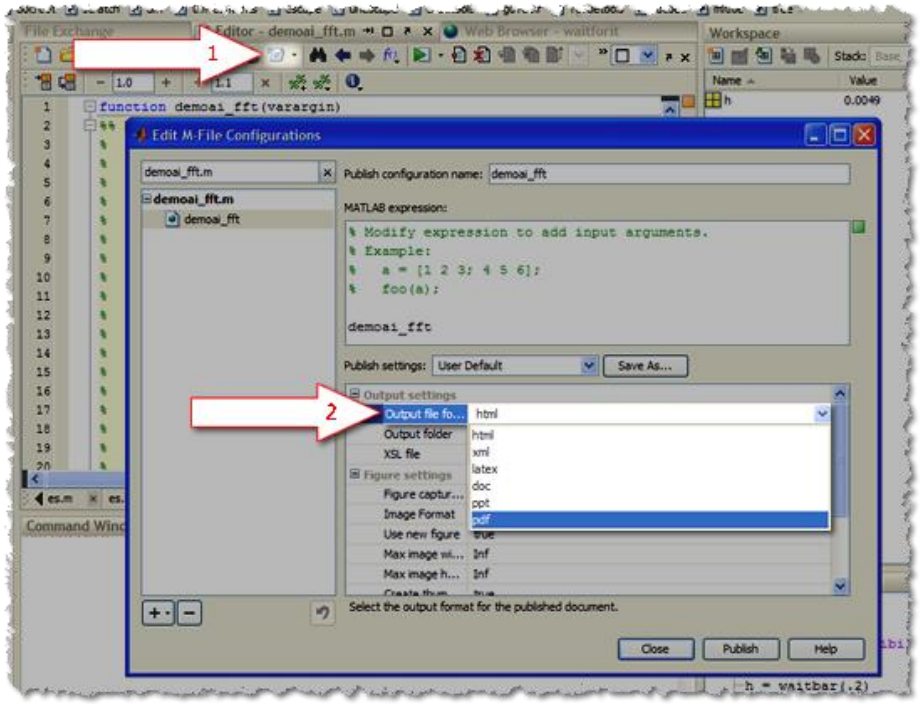
Some useful commands:

x = start:end	create row vector x starting with start, counting by one, ending at end
x = start:increment:end	create row vector x starting with start, counting by increment, ending at or before end
length(x)	returns the length of vector x
y = x'	transpose of vector x
dot (x, y)	returns the scalar dot product of the vector x and y

Creating Script File(M-file):

To create an **m-file**, choose New from the **File** menu and select Script. This procedure brings up a text editor window in which you can enter **MATLAB** commands. To save the **m-file**, simply go to the **File** menu and choose Save (remember to save it with the '**.m**' extension).

Publish PDF File:



Post Lab Questions

1. **What is MatLab?**

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2. **What can we use MatLab for?**

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3. **Which command is used to create a matrix of ones with 2 rows and 4 columns?**

_____

4. **What does the following command generate 20:2:30?**

_____

5. **What is case-sensitivity in MAtLab?**

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Lab Tasks

Task 1

a) Generate the following vectors:

A = [1 0 4 5 3 9 0 2]

a= [4 5 0 2 0 0 7 1]

Be aware that MATLAB is case sensitive. Vector A and a have different values.

b) Generate the following vector:

B= [A a]

Task 2

c) Operate with the following vectors to perform task (d) :

- V1 = [1 2 3 4 5 6 7 8 9 0]
- V2 = [0.3 1.2 0.5 2.1 0.1 0.4 3.6 4.2 1.7 0.9]
- V3 = [4 4 4 4 3 3 2 2 2 1]

d) What are the results of the following?

i. 9-V1

ii. V1*5

iii. V1+V2

iv. V1.*V2

v. V1.^2

vi. V1.^V3

vii. V1^V3