CHE/CEN138

COMPUTER PROGRAMMING

FUNCTIONS

References

1.Pratap, R. "Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers"Oxford University Press, 2010.

2.Hunt, B.R., Lipsman, L.R. and Rosemberg J. M. "A guide to MATLAB for Beginners and ExperiencedUsers"Cambridge Universty Press, 2001.

3.Kubat, C. "MATLAB Yapay Zeka ve Mühendislik Uygulamaları" İkinci Baskı, Pusula Yayıncılık, 2014McGraw Hill, International Edition 2012.

MATLAB PROGRAMS

Programming in Matlab is done by creating ".m" files.

File **-7** New **-7** M-File

Programs can be divided into two categories:

Script programs

Functions

MATLAB FUNCTIONS

The syntax for a MATLAB function definition is: function [return values] = myfunc (arguments)

function [val1, .. , valn] = myfunc (arg1, .., argk)

where *val1* through *valn* are the specified returned values from the function and *arg1* through *argk* are the values sent to the function.

Variables are local to the function. Only the values (not their addresses) are passed between the MATLAB workspace and the function.

MATLAB SCRIPTS / FUNCTIONS

Functions

Take inputs, generate outputs, have internal variables

Solve general problems for arbitrary parameters

Scripts

Operate on global workspace

Document work, design experiment or test

Solve a very specific problem once

MATLAB SCRIPTS

```matlab
% This is a MATLAB script file.
% It has been saved as "f13.m".

load f13.dat; voltage          %Load data file
= d13( : , 4);                 %Extract volts vector
time = .005*[1:length(voltage)]; %Create time vector
plot (time, voltage)           %Plot volts vs time
xlabel ('Time in Seconds')     % Label x axis
ylabel ('Voltage')             % Label y axis
title ('Bike Strain Gage Voltage vs Time')
grid                           %Put a grid on graph
```

MATLAB SCRIPTS

The preceding file is executed by issuing a MATLAB command:

>> f13

This single command causes MATLAB to look in the current directory, and if a file f13.m is found, open it and execute all of the commands. The result, in this case, is a plot of the data from f13.dat.

If MATLAB cannot find the file in the current working directory, an error message will appear.

MATLAB SCRIPTS

When the file is not in the current working directory, a cd or chdir command may be issued to change the directory.

```
>> cd a:\    % Make a:\ the current working directory
>> fl3
```

MATLAB FUNCTIONS

A MATLAB function file (called an M-file) is a text (plain ASCII) file that contains a MATLAB function and, optionally, comments.

The file is saved with the *function name* and the usual MATLAB script file extension, ".m".

A MATLAB function may be called from the command line or from any other M-file.

Function declaration starts with declaring the signature:

• the name of the function,

• function arguments

• function output parameters

MATLAB FUNCTIONS

When the function is called in MATLAB, the file is accessed, the function is executed, and control is returned to the MATLAB workspace.

Since the function is not part of the MATLAB workspace, its variables and their values are not known after control is returned.   (Script file variables are left in the workspace)

Any values to be returned must be specified in the function syntax.

MATLAB FUNCTIONS

- The syntax for a MATLAB function definition is: function [val1, … , valn] = myfunc (arg1, … , argk)

  - where *val1* through *valn* are the specified returned values from the function and *arg1* through *argk* are the values sent to the function.

- Since variables are local in MATLAB (as they are in C), the function has its own memory locations for all of the variables and only the values (not their addresses) are passed between the MATLAB workspace and the function.

It is OK to use the same variable names in the returned value list as in the argument.   The effect is to assign new values to those variables.   The following function swaps two values:

function [a , b] = swap (a , b)

% The function swap receives two values, swaps them, and returns

% the result. The syntax for the call is   [a, b] = swap (a, b) where

% the a and b in the ( ) are the values sent to the function and the

% a and b in the [ ] are returned values which are assigned to

% corresponding variables in your program.

temp=a;

a=b;

b=temp;

MATLAB FUNCTIONS

To use the function a MATLAB program could assign values to two variables (the names do not have to be a and b) and then call the function to swap them. For instance the MATLAB commands:

>> x = 5 ; y = 6 ;   [x , y] = swap (x , y)

result in:

x =

6

y =

5

MATLAB FUNCTIONS

```
function [n] = factorial (k)
% The function [n] = factorial(k) calculates and
% returns the value of k factorial. If k is negative,
% an error message is returned.
if (k < 0)  n = 'Error, negative argument';
elseif k<2  n=1;
else
   n = 1;
   for j = [2:k]   n = n * j;   end
end
```