Lesson Four Student Notes

Script Files and Function Files

MATLAB provides a full programming language that enables you to write a series of **MATLAB statements** into a file and then execute them with a single command. You write your program in an ordinary text file, giving the file a name of filename.m. The term you use for **filename** becomes the new **command** that MATLAB associates with the program. The file extension of **.m** makes this a MATLAB M-file.

M-files can be **scripts** that simply execute a series of MATLAB statements, or they can be **functions** that also accept input arguments and produce output. In an M-file any line that begins with **%** is not executable. The basic parts of an M-file are the **function definition line**, the **H1 line**, the **Help text**, the function or script **body**, and **comments**. The function definition line defines the function name, and the **number** and **order** of input and output arguments. The H1 line is a one line summary description of the program, displayed when you request **help** on an entire directory, or when you use **lookfor**. The Help text is a more detailed description of the program, displayed together with the **H1 line** when you request **help** on a specific function. The body is the program code that performs the actual **computations** and assigns **values** to any **output arguments**. **Comments** are text in the body of the program that explains the internal workings of the program.

If the function has multiple output values, enclose the output argument list in **square brackets**. Input arguments, if present, are enclosed in **parentheses** following the function name. Use **commas** to separate multiple input or output arguments. The H1 line, so named because it is the first help text line, is a **comment** line immediately following the function definition line. Because it consists of **comment** text, the H1 line begins with a **percent sign, %**. You can create online help for your M-files by entering help text on one or more consecutive **comment** lines at the **start** of your M-file program. MATLAB considers the first group of consecutive lines immediately following the H1 line that begin with **%** to be the online help text for the function. The first line without **%** as the left-most character ends the help. When you type help functionname at the command prompt, MATLAB displays the **H1 line** followed by the **online help text** for that function. **Comment** lines can appear anywhere in an M-file, and you can append **comments** to the end of a line of code.

Scripts are the simplest kind of M-file because they have no input or output arguments. Scripts share the base workspace with your interactive MATLAB session and with other scripts. They operate on **existing data** in the **workspace**, or they can create new data on which to operate. Any **variables** that scripts create remain in the workspace after the script finishes so you can use them for further computations.

Functions are program routines, usually implemented in M-files, which accept **input arguments** and return **output arguments**. They operate on variables within their **own workspace**. This workspace is **separate** from the workspace you access at the MATLAB

command prompt. Each M-file function has an area of **memory, separate** from the MATLAB base workspace, in which it operates. This area, called the **function workspace**, gives each function its own **workspace context**. While using the MATLAB command line you cannot access variables in the **function workspace** except through the **input and output arguments**. The variables that you pass to a function must be in the input argument list (identified by position not by name). The results of a function are passed back through the **output arguments**. The exception to these rules are variables which have been defined as **global** variables. **Global** variables may be accessed from both the MATLAB command line and one or more function workspaces.