

MATLAB Primer
Based on: "Mastering MATLAB"

1. Name the code block with a descriptive program-name so that you can execute it by name. “%” is the delimiter for comments/non-executable code.

Top statements should be:

| | |
|---------------------------|---|
| % program-name | brief program description |
| clear all; | % Clear memory/flush buffers |
| help program-name; | % Gives help instructions with error diagnostics |

and save this as program-name.m

2. MATLAB has a program editor separate from the program executor. Both programs should be left open at all times.

3. Ending a statement in a ";" causes it to be executed. Leaving off the ";" executes the statement as well as printing the intermediate result. This is good for debugging, disastrous for statements within repetitive loops.

4. Simple Math with simple variables and allowed mathematical functions: Chapter 1.

5. Variable names are case sensitive.

6. Arrays are dynamically created, and have a length equal to what you have filled to date. They are addressed/accessed for a single element in a 2-D array (say for the 5,2 element) as $x(5,2)$. To access elements in a block, one can specify the elements of say the first five elements of a 1-D array by $y(1:5)$. Or to address elements in unusual order, $z([9\ 2\ 5\ 1])$ will produce $z(9)$, $z(2)$, $z(5)$, $z(1)$.

7. Arrays are filled by a variety of means. One can serially address them as: $x(2) = 3.0$; $x(10) = 1.0$; If the elements are evenly spaced (such as in a time array), one can specify them by: $y(\text{start: increment: end})$, i.e. $y(0: 1: 55)$ will produce elements that are the integers between 0 and 55. One can also either zero-fill or one-fill an array through the “zeros” and “ones” functions. A 3-D array is specified/reserved by your index references it. For instance, the statement $u(1:1;50, 1:1\ 100, 1:2:50)$ produces an array that is 50 x 100 x 25.

8. Mathematics of arrays is a one-stepper (MATLAB's great strength!). One uses the notation "operand + ." to automatically do array arithmetic. Array attributes are found by using assessment functions.

9. When making choices about which direction to send the code next, it is often convenient to compare values, and make the choice based upon that.

10. Control Flow:

a) Repetitive actions:

FOR loops

for n = start: increment: end;

statements;
end

WHILE loops

n=0;

while relational express; (such as n < 10)

statements; (such as x(n) = n; n = n+1;)
end

b) Decision branching

IF-ELSE-ELSEIF constructions

if expression; (such as n<100)

statements;
elseif expression; (such as n<100)
 statements;

elseif expression; (such as n>100)

end

11) Function Mfiles

Sometimes one wishes to run a major code, but alter slightly only one treatment (such as during interpolation, apply a linear function, a quadratic function, etc.). One can write series of functions, one for each such altered procedure, and name them as Mfiles. One then merely passes the name of the particular procedure to the main code (even dynamically) and that function is called into the main code and executed. One DOES need to assess before hand the number of arguments passed by each function, and one uses the FEVAL function.