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Summary of Chapter 8 of
"A First Course in Electrical and Computer Engineering"

Chapter 8 : An Introduction to MATLAB

MATLAB stands for *Matrix Laboratory* .MATLAB can be thought of as a programming language.
It can be used in an interactive mode wherein statements are executed immediately as they are typed.
MATLAB has four types of windows:

i. Command for computing, programming, and designing in-put/output displays;
ii. Graph for displaying plots and graphs;
iii. Edit for creating and modifying your own files; and
iv. Help for getting on-line help and for running demos.

When you run MATLAB, you should see the prompt >> The program interpreter is waiting for you to enter instructions. In command mode, MATLAB displays a prompt >> and waits for your input. You may type any legal mathematical expression for immediate evaluation.
The variable pi = 3.14 is built into MATLAB, as are the sin function and hundreds of other functions. When you entered each of the preceding lines, MATLAB stored the results in a variable called ans for answer.
A semicolon (;) at the end of the line suppresses printing of the result.
MATLAB supports the dynamic creation of variables. You can create your own variables by just assigning a value to a variable. For example,
type x = 3.5+4.2. Then the real variable x contains the value 7.7. Variable names must start with an alphabetical character and be less than nineteen characters long.
To clear all the variables, type in <u>clear</u>. To clear a single variable (or several) from the list, <u>follow the command clear by the name of the variable you want to delete or by a list of variable names separated by spaces.</u>
MATLAB is case sensitive. In other words, x and X are two different variables. You can control the case sensitivity of MATLAB by entering the command casesen, which toggles the sensitivity. The command casesen on enforces case sensitivity, and casesen off cancels it. If one line is not enough to enter your command, then finish the first line with two dots (. . and continue on the next line. You can enter more than one command per line by separating them with commas if you want the result displayed ,or with semicolons if you do not want the result displayed
The number $\sqrt{-1}$ is predefined in MATLAB and stored in the two variable locations denoted by i and j. i and j are variables, and their contents may be changed. Using j, you can now enter complex variables. For example, enter z1 = 1+2*j and z2 = 2+1.5*j. As j is a variable, you have to use the multiplication sign *. Otherwise, you will get an error message. MATLAB contains several built-in functions to manipulate

complex numbers. For example, real (z) extracts the real part of the complex number z. Similarly it has imag(z), abs(z) and angle(z).
The simplest way to enter a matrix is to use an explicit list. In the list,the elements are separated by blanks or commas, and the semicolon (;) is used to indicate the end of a row. The list is surrounded by square brackets [ ].
Individual matrix elements can be referenced with indices that are placed inside parentheses.
Note that the size of x has been automatically adjusted to accommodate the new element and that elements not referenced are set equal to 0 .
The command size(A) gives the number of rows and the number of columns of A.
The special character, ', for prime denotes the transpose of a matrix. For an “unconjugate” transpose, use the two-character operator dot-prime(. ').
The inverse of a matrix is computed by using the function inv(A) and is only valid if A is square. The period (dot) indicates an “array operation” to be performed on each element of A. Appending to a Matrix or Vector. A matrix or vector can be enlarged in size by appending new values to the old values.
Its basic meaning is a vector of sequential values. Generally “first Num : incremental Step : final Nun”
plot(VAR_NAME,'o')
specify the symbol for display, and the authorized symbols for point display are '.', 'o', '+', and '*'.
<u>Note that the second plot command erases the first plot and changes the scaling. If you want to have the points plotted on the same graph, you have to use the command hold on </u>after the first plot.
The advantage in using the hold command is that there is no limit to the number of plot commands you can type before the hold is turned o, and these plots may involve the same variable plotted over a range of values. You can also use different point displays. A disadvantage of the hold command is that the scaling is enforced by the first plot and is not adjusted for subsequent plots. You can freeze the scaling of the graph by using the command **axis.** *axis([xmin xmax ymin ymax])*
To add labels to your graph, the functions xlabel('text'),ylabel('text'), and title('text') Subplots. It is possible to split the graphics screen up into several separate smaller graphs rather than just one large graph.
Help and Demos: MATLAB has on-line help and a collection of demonstrations. The demos will also help you become more familiar with MATLAB and its capabilities.
Finally <u>For</u> and <u>while loops</u> are instructed. They are so similar to verilog loops.
For more details ,take a look at MATLAB manual