
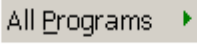


What is MATLAB?

MATLAB (short for **MAT**rix **LAB**oratory) is a language for technical computing, developed by The Mathworks, Inc. (A matrix is a rectangular array or table of *usually* numerical values.) MATLAB provides a single platform for computation, visualization, programming and software development. All problems and solutions in MATLAB are in a notation very similar to the way mathematics is written. In addition, you can use MATLAB to build Graphical User Interfaces (GUIs) so that you can develop user-friendly custom software.

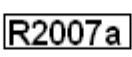

MATLAB is widely used in all areas of applied mathematics in education and research at universities and in industry. MATLAB is a great tool for solving a wide variety of problems in science, engineering, and finance. In addition, MATLAB has powerful graphic tools and can produce nice pictures in both 2D and 3D. It is also a programming language (similar to C) and is one of the easiest programming languages for writing mathematical programs.

Starting MATLAB Logon at MSRC using desktop icon  . To logon onto a Temple workstation at the Tech Center, follow the directions below.

Click  → then Click  You will see a dropdown menu with lots of programs listed.

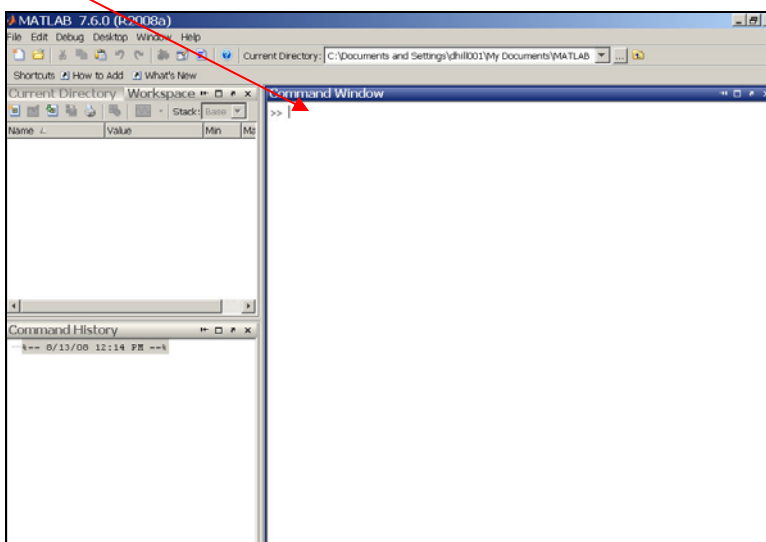
Find the one named Instructor Software and click on it. Another dropdown menu will appear. Find one named Math Software and click on it.

From the list find the one named **MATLAB** and click on it. You will then see buttons to click.

Click both of these to start MATLAB.

This is where you enter commands. The MATLAB environment consists of menus, buttons and a writing



area similar to an ordinary word processor. There are plenty of help functions that you are encouraged to use. The writing area that you will see when you start MATLAB, is called the **command window**. In this window you give the commands to MATLAB. For example, when you want to enter a command or run a program you have written for MATLAB you start in the command window by typing its name after the prompt. (**MATLAB's prompt is >>.**) Once you have typed the command you wish MATLAB to perform, press Enter. The command window is also useful if you just want to use MATLAB as a scientific calculator or as a graphing tool. **Quitting MATLAB:** To quit MATLAB, at a MATLAB prompt type command **quit** or **exit**, then press Enter.

Using MATLAB as a (scientific) calculator

MATLAB's computational engine uses (about) 15 decimal digits in computations (unless directed to do otherwise). So it can be used as a powerful calculator for arithmetic expressions and the calculation of values of function expressions.

Arithmetic Operations	MATLAB command
+ (addition)	+ a + b
- (subtraction)	- a - b
x (multiplication)	* a*b (a times b)
/ (division)	/ a/b, b ≠ 0
^ (exponentiation)	^ a^b (a raised to the b power a ^b)

WARNING: You must indicate multiplication using the * .

Examples: In expressions it good practice to use parentheses as illustrated below. This is particularly important for fractions which are used in MATLAB.

<u>MATLAB expressions</u>	<u>Value shown in format long e</u>	<u>Value in format short</u>
(1.5 - 4.67)*(9/3.1)	-9.203225806451613e+000	-9.2032
(5.2 - 3.72)^(1/2)	1.216552506059644e+000	1.2166
(7.02 + 12.3)/(4.25 - 3.125)	1.717333333333333e+001	17.1733

In MATLAB you can control how a numerical value is displayed by using what are called format commands. After a MATLAB prompt type command **format long e** or **format short** to get the displays above. Other such commands are **format long** and **format short e**.

The number π (pi) in MATLAB can be accessed by using the name **pi**. Here is what is displayed for π in various formats.

Format short display for pi	3.1416
Format long display for pi	3.141592653589793
Format short e display for pi	3.1416e+000
Format long e display for pi	3.141592653589793e+000

Note that the "e formats" display in scientific notation; 5.6782e+002 means 5.6782×10^2 .

Also note that the last decimal digit in a "short display" is obtained by rounding.

Regardless of the display format used to show values on the screen computations are done with 15 digit arithmetic.

Use command **help format** for the description of other display formats.

Special case: A value which is exactly zero will be displayed as a **single zero**. If you see 0.0000, the value is not exactly zero. Change to a long format and re-display it.