

MATLAB CHEATSHEET

How to download Matlab:

- Go to the UIUC webstore: <https://webstore.illinois.edu/home/>
- Click on Personal Purchases
- Type "Matlab" in the Product Search text box
- Select the "Matlab License and Download"

- Select "Download only" among the choices and follow the instructions to install the software on your computer. When you install Matlab, make sure you install the Symbolic toolbox - this will be useful for your courses. If you can, install everything.

When you open Matlab you will see the following (note that the windows within Matlab may be arranged slightly differently)

The image shows the MATLAB 7.6.0 (R2009a) desktop environment. It features several windows:

- Current Directory:** A file explorer window on the left showing the current folder and its contents.
- Editor:** A central window for writing and editing MATLAB code.
- Workspace:** A window on the right displaying variables and their values.
- Command Window:** A window at the bottom for entering and executing commands.
- Command History:** A window at the bottom right showing a list of previously entered commands.

 Callout boxes with arrows point to each of these windows, providing a brief description of their function.

Current Directory: A window that shows which folder you are in and all the files that are in it

Editor: A place to write commands that can be saved and run in real time or later

Workspace: Variables you define are displayed here

Command Window: A place to write commands, perform calculations

Command History: What you type in the box to the left of this one is saved here

Calculations can be done either in the "Command window" or the "Editor". The command window is a temporary place to see your commands, the commands themselves are saved in the "Command history", but not the answers. The solution to the calculation is displayed in the "Command Window" and stored in the "Workspace". If you do not assign a variable name to the calculation, the answer is stored in the default variable name "ans" .

For example, if we want to add $3 + 5$, we can type: $3 + 5$ in the Command Window.

```
Command Window
>> clear all
>> 3 + 5

ans =

     8

fx >>

Command History
clear b
clear p
for x = 1:5
[b(x),p(x)] = ttest2(c...
end
b
p
processeffStrainSEDall...
%-- 1/15/16, 9:47 AM --%
clc
clear all
3 + 5
```

Now we can assign a variable to the answer:

```
Command Window
>> 3 + 5

ans =

     8

>> A = 3 + 5

A =

     8

fx >>

Command History
clear b
clear p
for x = 1:5
[b(x),p(x)] = ttest2(c...
end
b
p
processeffStrainSEDall...
%-- 1/15/16, 9:47 AM --%
clc
clear all
3 + 5
A = 3 + 5
```

Note that at this point, the answer is a variable of size (m,n) where m is the number of rows, and n is the number of columns. For this example, A is a 1×1 array.

Often, you will be adding vectors - your variable would then be a 1×2 vector array (for 2-D problems) or a 1×3 array (for 3-D problems).

General guidelines

- Create your vectors as variables (e.g. $A = [1 \ 2 \ 3]$; $B = [3 \ 4 \ 5]$)
- Perform secondary calculations using these variables and save this as another variable (e.g. $C = A + B$)
- DO NOT round intermediate calculations
- Give your variables meaningful names (e.g. force1, F1, moment1, fAB for a force going from A to B)

Helpful Matlab commands

- add = +
- subtraction = -
- multiplication = *
- division = /
- $\det(D)$: determinant of a square matrix
- $\text{dot}(A,B)$: dot product of two vectors
- $\text{cross}(A,B)$: cross product of two vectors
- $\text{norm}(A)$: Magnitude of a vector
- $\cos(x)$ $\text{acos}(x)$
- $\sin(x)$ $\text{asin}(x)$
- $\tan(x)$ $\text{atan}(x)$
- $\cot(x)$ $\text{acot}(x)$
- $\csc(x)$ $\text{acsc}(x)$
- $\sec(x)$ $\text{asec}(x)$
- $\text{atan2}(x,y)$

Careful!!! Matlab defaults to radians, so if you want to use degrees you have 2 options:

- Cosd = cosine(in degrees)

OR

To convert from radians to degrees

- rad2deg (deg2rad also exists)
- Do the math itself
- π is predefined in Matlab as `pi`