

Wednesday Lecture !

# PROGRAMMING



**WHAT PEOPLE THINK I DO**



**WHAT MY MOTHER THINKS**



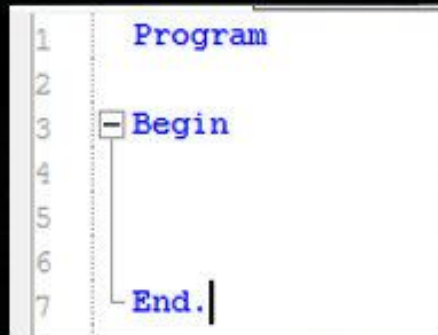
**WHAT MY FRIENDS THINK I DO**



**WHAT MY TEACHER THINKS**



**WHAT I THINK I DO**



**WHAT I ACTUALLY DO**

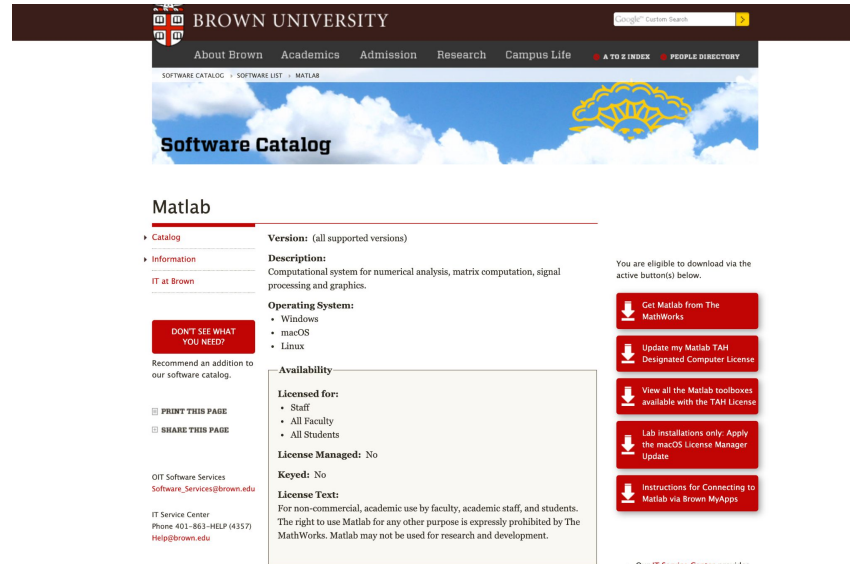
# Agenda

1. Let us take some steps back.
2. Super quick intro to matlab
3. Types of data
4. Logic operands and relations
5. Problem

# Let us take some steps back...

## Where to get matlab?

## Go to software.brown.edu and search for matlab



The screenshot shows the Brown University Software Catalog page for Matlab. The page has a dark blue header with the Brown University logo and navigation links. Below the header is a search bar and a navigation menu. The main content area features a large blue banner with the text "Software Catalog" and a yellow sun icon. Below the banner, the page is titled "Matlab" and contains a sidebar with navigation links, a main content area with details about Matlab, and a right sidebar with download options.

**BROWN UNIVERSITY**

SOFTWARE CATALOG SOFTWARE LIST MATLAB

### Software Catalog

#### Matlab

**Version:** (all supported versions)

**Description:**  
Computational system for numerical analysis, matrix computation, signal processing and graphics.

**Operating System:**

- Windows
- macOS
- Linux

**Availability**

**Licensed for:**

- Staff
- All Faculty
- All Students

**License Managed:** No

**Keyed:** No

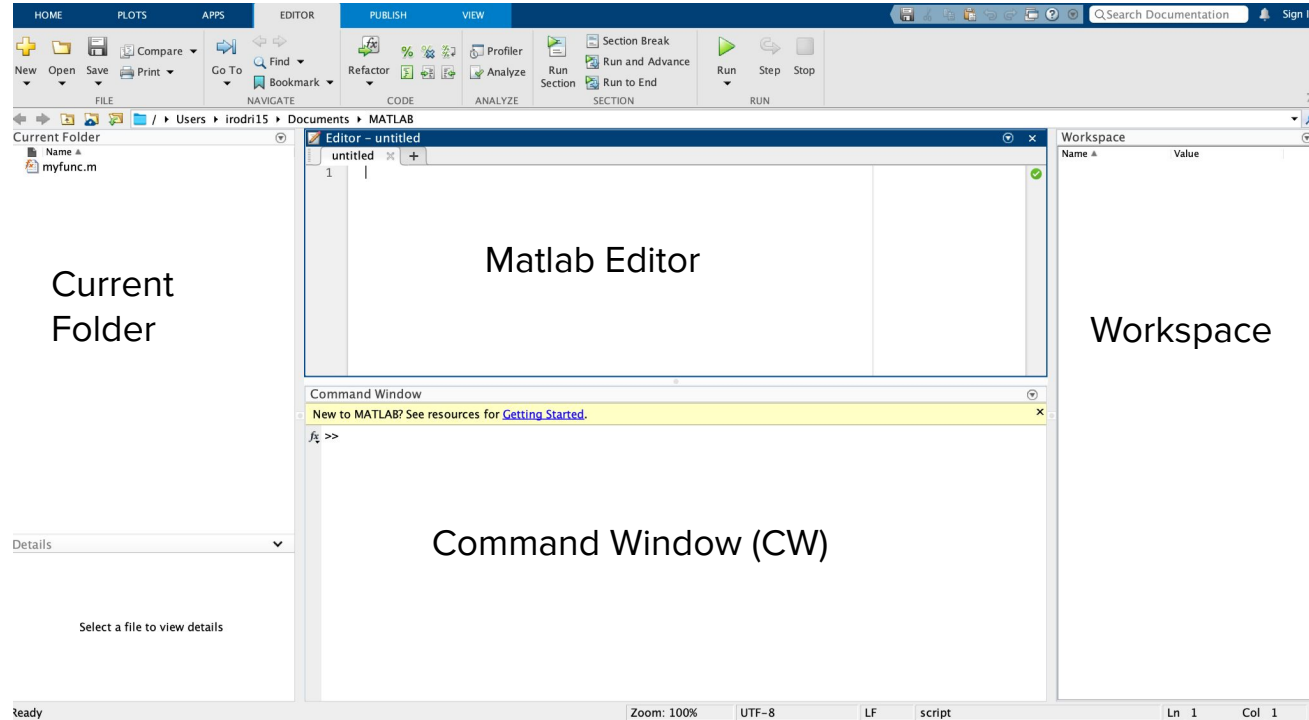
**License Text:**  
For non-commercial, academic use by faculty, academic staff, and students. The right to use Matlab for any other purpose is expressly prohibited by The MathWorks. Matlab may not be used for research and development.

You are eligible to download via the active button(s) below.

- Get Matlab from The MathWorks
- Update my Matlab TAH Designated Computer License
- View all the Matlab toolboxes available with the TAH License
- Lab installations only: Apply the macOS License Manager Update
- Instructions for Connecting to Matlab via Brown MyApps

• Our IT Service Center provides

# What to expect when opening matlab?



## Useful commands:

- what : List all **m-files** in current directory
- dir/ls : List **ALL** files in current directory.
- pwd: Show the current directory path
- who : List all known variables
- whos : List all know variables plus their size
- clear : Clear variables from workspace
- clc : Clear the command view ( in mac: Command+k)
- **why : PLEASE TRY THIS ONE!**

# M- files

- An M-file might be used as a script, i.e. file consist set of statements
- In additional, one use M-files to write function, in this case the file starts with function definition like:
  - `function y = f(x)`
  - `function [u,v] = f(x,y,z)`
- File name and the name of function in the file are usually identical, however while they are different, **MATLAB use file name to call function.**
- If you add additional function in same M-file, it considered sub-function and might be called from inside the M-file only. **Only the first function might be called from outside.**

# Type of Variables

Is important to be aware of the distinction between type of variables. In general you will find:

- Double
- Char (strings)
- Boolean
- Arrays

Use the command **whos** to find about some variable Type.

```
>> x = 5
x =
    5
>> whos x
  Name      Size      Bytes  Class  Attributes
  ----      -
x          1x1           8  double
>> x = 'five'
x =
    'five'
>> whos x
  Name      Size      Bytes  Class  Attributes
  ----      -
x          1x4           8   char
>> y = false
y =
    logical
    0
>> whos y
  Name      Size      Bytes  Class  Attributes
  ----      -
y          1x1           1  logical
>> |
```



# Examples:

$x = 1$  ; Define an scalar

$y = [1 \ 2 \ 3]$  Defines a vector with three positions

$z = [1;2;3]$  Defines a column vector

$A = [1 \ 2 \ 3; 4 \ 5 \ 6; 7 \ 8 \ 9]$  Defines a matrix

$v = \text{'String'}$

$t = [ \text{'a'}, \text{'b'} ]$

# Logical Operands and relations

## OPERANDS

- &,&& (AND)
- |, || (OR)
- ~ (NOT)
- xor (Exclusive OR)

## In matlab:

1 is True

0 is False

Actually any number is True, except 0.

# Logical Operands and relations

## OPERANDS

- &, && (AND)
- |, || (OR)
- ~ (NOT)
- xor (Exclusive OR)

## In matlab:

1 is True

0 is False

Actually any number is True, except 0.

Let's play: What it is?

- $(1\&0)\&(1|1)\&(1)\&(1)$
- $1|| (0\&0)\& \text{ xor}(1,0)$
- $a = 1, b = 0$
- $a \& \sim a$
- $b || \sim b$
- $\sim(a \& b)$
- $\sim a | \sim b$

# Logical Operands and Relations

## Relations

- **== Equal**
- **> more than,**
- **< less than**
- **<= less or equal**
- **>= more or equal**
- **~= different**

Now we can combine logical operands and relations

- $\sim((3>5) \& (2>4))$
- $(5>3) \parallel (3==(1+2))$