Introduction to MATLAB bootcamp

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Bootcamp overview

- Class schedules:
  - Tuesday: 2-3 pm
  - Thursday: 2-3 pm

- Office hours: Friday 10-11 am

- Weekly assignments: 1-2 hours, assigned Friday, ungraded but will receive feedback

Course overview

- Provide a welcoming and safe space to everyone to ask questions
- There is NO dumb question.
- This course is for you, so please provide anonymous feedback using the google form, so that I can improve.

- I am not an expert ➜ I am also learning.
- Practice, practice, and practice coding.
- Google and stackoverflow will be your best friends.

- Group work is highly encouraged.

Some other excellent resources to learn MATLAB

Please check these excellent resources:

- [Github repo by Mai Nguyen](#)

- [MIT Open courseware](#)

Home -> layout -> Three column

Working directory

script

Files in the working directory

Workspace variable

Command window

This is how you define a variable:

1) Here we created a new variable num1 and assigned it a value of 10
2) Note that the information always transfer from right to left! (try num1=num2; and see what is the new value of num1)
3) Observe that once you assign values to the variables they appear in the workspace
4) Can you tell the effect of using semicolon (;) at the end of command line?

Helpful tips for MATLAB

```
week_1_lecture_1.m

Command Window
    cler
    clear
    clc
    num1=10
    num2=20;
    num1=10
    num2=20;
    num3=num1;
>> num3=num1;
```

1) You can press up arrow and select any of the previous commands.

2) You can autocomplete the name of a variable by pressing on tab key

clear, clc, close all

- clear   %%% it removes all the elements from workspace
- clc   %%% it clears the texts in the command window
- close all   %%% it closes all the figures (will be useful later in the bootcamp)

- I usually include all these commands at the beginning of each matlab script

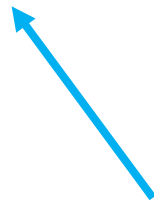# First MATLAB command

MATLAB In-built function

Input to the function passed inside the brackets

```
>> disp('Hello world, this is a MATLAB command')
Hello world, this is a MATLAB command
```

Output of the function

Help function in MATLAB

```
Command Window                                              ⊙

>> help disp
 disp Display array.

    disp(X) displays array X without printing the array name or

    additional description information such as the size and class
name.

    In all other ways it is the same as leaving the semicolon off an

    expression except that nothing is shown for empty arrays.


    If X is a string or character array, the text is displayed.


    See also formattedDisplayText, sprintf, num2str, format, details.


    Documentation for disp

    Other functions named disp
```
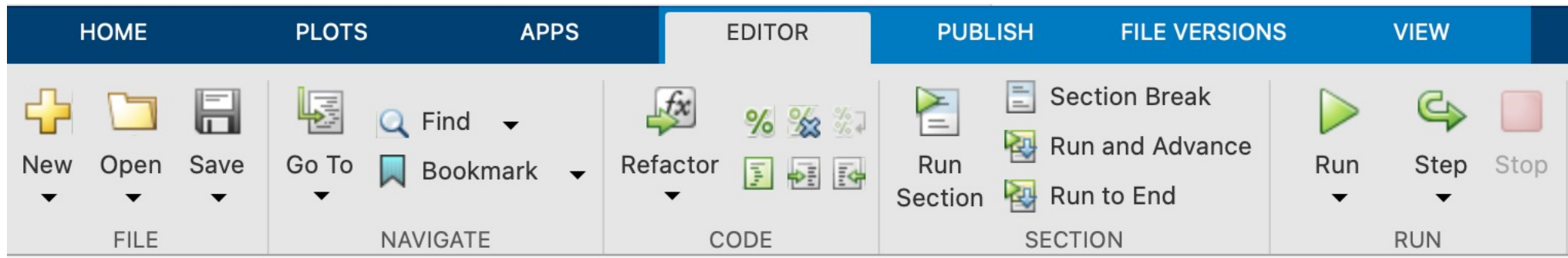
Running your MATLAB script

1. Running from command window

2. Run section

3. Run and advance

4. Run to end

5. Run

Assigning values to variables
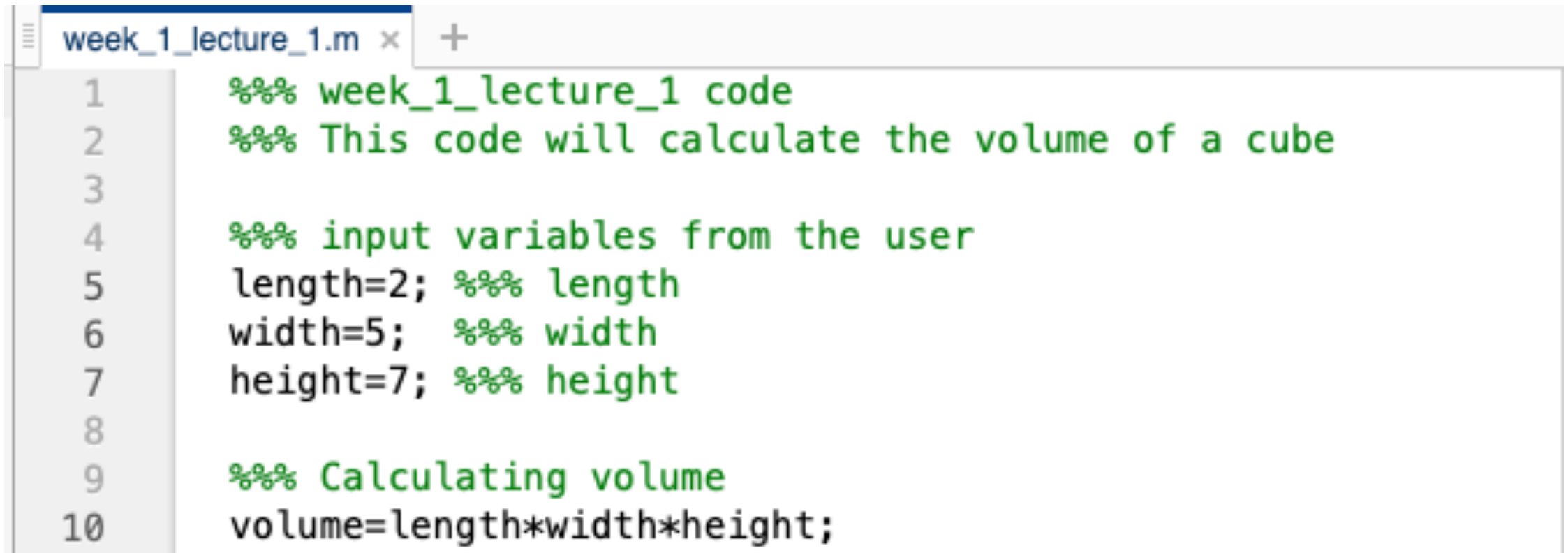
- a=5;
- a+2

- What is the new value of a?
- How can you increase the value of variable 'a' by 2?

Calculation using variables

- volume= length x width x height
- length=2;
- width=5;
- height=7;
- volume=length*width*height;

- How will you print the value of the variable volume?
- How will you print the value of the variable volume and width together?

Using MATLAB editor

```matlab
week_1_lecture_1.m  ×   +
1       %%% week_1_lecture_1 code
2       %%% This code will calculate the volume of a cube
3
4       %%% input variables from the user
5       length=2; %%% length
6       width=5;  %%% width
7       height=7; %%% height
8
9       %%% Calculating volume
10      volume=length*width*height;
```

1) Any line of code which begins with % is considered as comment and is not executed by MATLAB.
2) Using %% will divide the code into sections (very helpful)
3) Adding comments at the very top of the code will be displayed when you use help filename.m

Predefined values and variables in MATLAB

Expression	Description
pi	The number π up to 15 significant digits.
i, j	The complex number $\sqrt{-1}$.
inf	Represents the mathematical Infinity concept, for example, a result of division by zero.
NaN	Stands for Not-A-Number. Represents the result of a meaningless mathematical function, like $0/0$.
clock	Contains the current date and time in the form of a 6-element row vector: year,month,day,hour,minute,second.
date	Contains a string representing today's date.
eps	Stands for **epsilon**. It represents the smallest number that can be represented by your MATLAB software.
ans	A special variable that MATLAB uses to store the result of MATLAB's command line.

Keywords in MATLAB

- MATLAB has pre-defined keywords such as while, for, if, parfor, global etc.

- You cannot use these keywords as a variable e.g. you cannot use while=1;

- To see the complete list of keywords, enter iskeyword in the command window.

- Also, try not to use MATLAB functions as variable names. For e.g. avoid use mean=4, sin=20;

Time taken by MATLAB to execute a code

```
22    %%
23    tic
24    exp(500)
25    toc
26
```

```
Command Window
>> tic
exp(500)
toc


ans =

   1.4036e+217


Elapsed time is 0.034693 seconds.

>>
```

MATLAB tells the time to execute a command between tic and toc

Infinity and NaN (Not a number)

- Inf: Inf is the outcome of division by 0 (e.g. 1/0) or overflow when the result is too large (e.g. exp(1000))

- NaN: MATLAB uses NaN to represent the numbers which are not real or complex. e.g. 0/0, Inf/Inf

- Usually in experiments/data analysis, the missing data points are represented by NaN.

https://www.mathworks.com/help/matlab/matlab_prog/infinity-and-nan.html