

Digital Signal Processing Lab

Lab Report # 01



Submitted By: AWAIS SADDIQUI

Registration No: 21PWCSE1993

Section: "A"

"On my honor, as student at University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work"

Student Signature: _____

Submitted to:

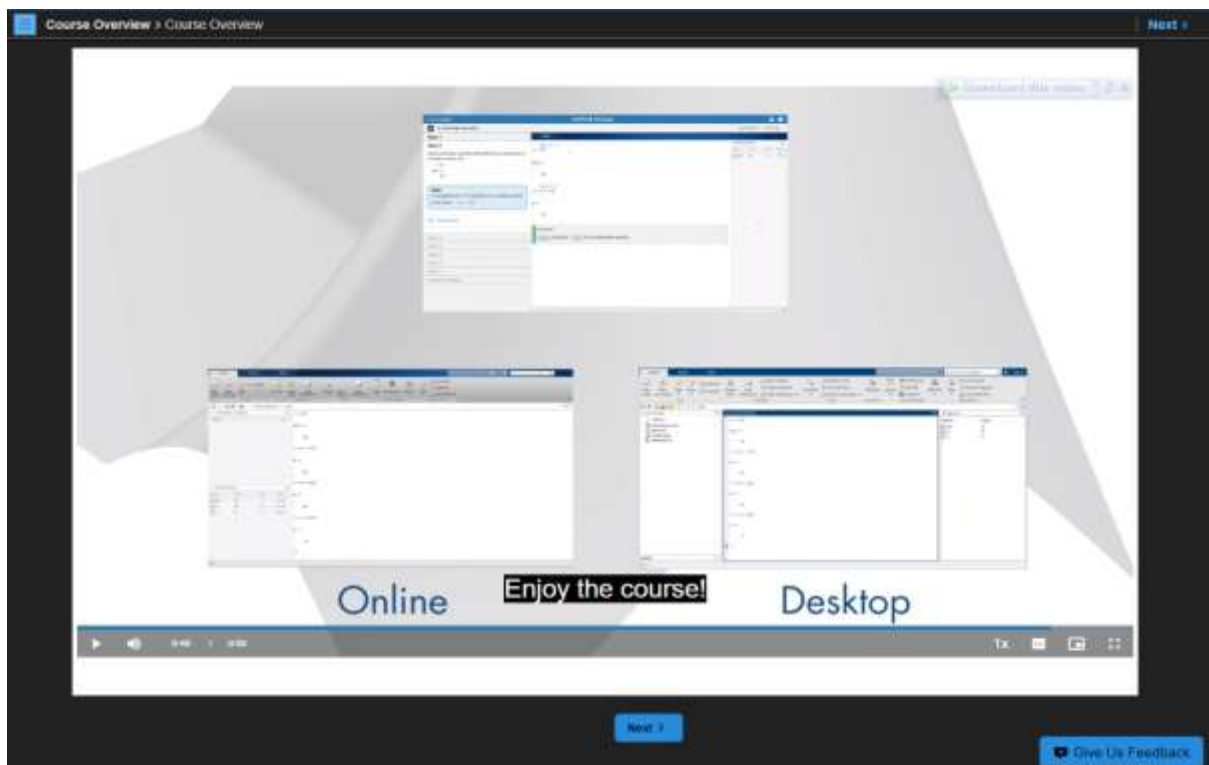
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Demonstration of Concepts	Poor (Does not meet expectation (1))	Fair (Meet Expectation (2-3))	Good (Exceeds Expectation (4-5))	Score
	The student failed to demonstrate a clear understanding of the assignment concepts	The student demonstrated a clear understanding of some of the assignment concepts	The student demonstrated a clear understanding of the assignment concepts	30%
Accuracy	The student mis-configured enough signal processing settings that the computer couldn't function properly.	The student configured enough signal processing settings that the computer partially functioned	The student configured the signal processing settings that the computer fully functioned	30%
Following Directions	The student clearly failed to follow the verbal and written instructions to successfully complete the lab	The student failed to follow the some of the verbal and written instructions to successfully complete all requirements of the lab	The student followed the verbal and written instructions to successfully complete requirements of the lab	20%
Time Utilization	The student failed to complete even part of the lab in the allotted amount of time	The student failed to complete the entire lab in the allotted amount of time	The student completed the lab in its entirety in the allotted amount of time	20%

1. Course Overview:

- a. **Objective:** Familiarize yourself with the course.

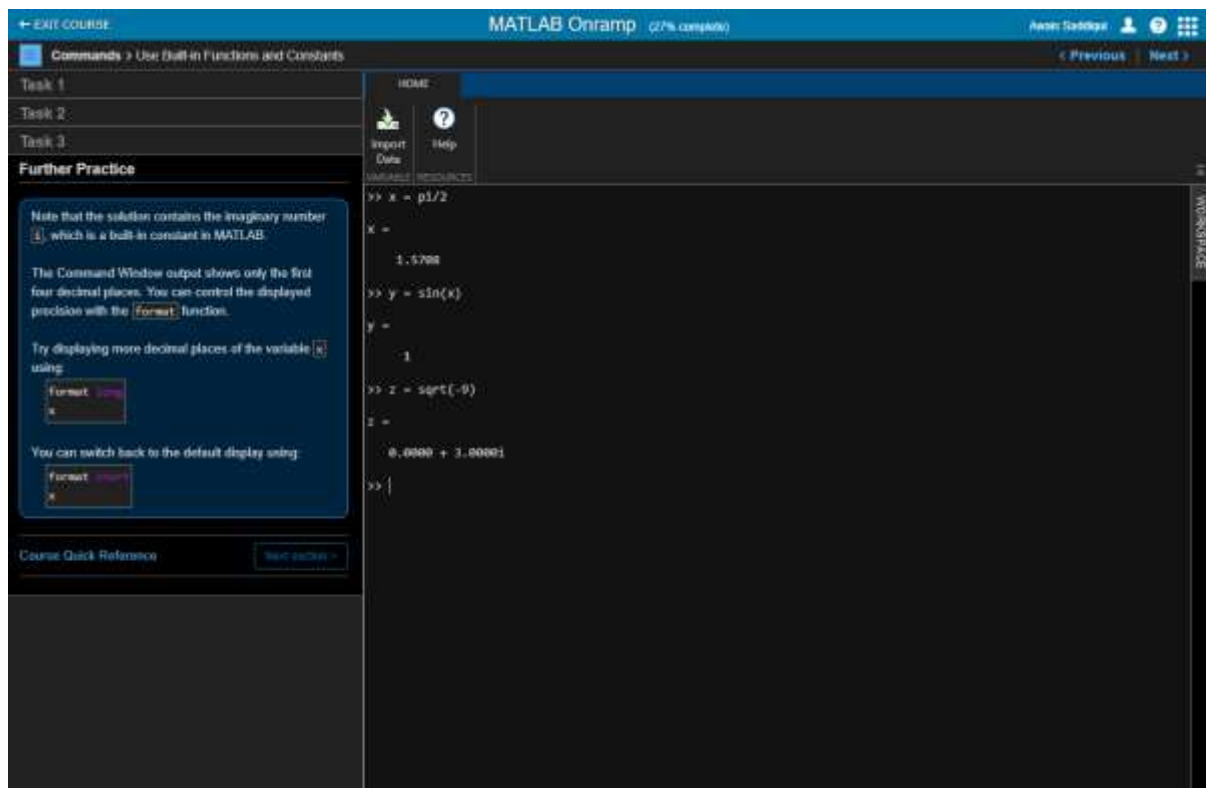


b. Remarks:

Introduction of MATLAB and it's uses in real world problems.

2. Commands:

- a. **Objective:** Enter commands in MATLAB to perform calculations and create variables.

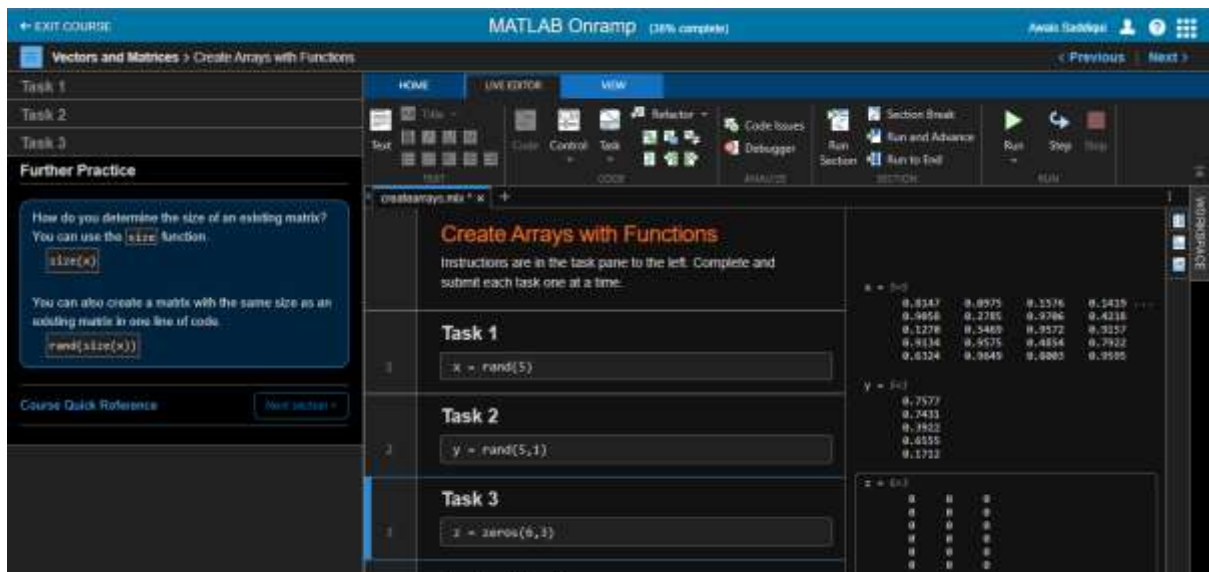


- b. **Remarks:**

In this section, I learned how to enter commands in MATLAB. And how save and load variables also use built in functions and constants.

3. Vectors and Matrices:

- a. **Objectives:** Create MATLAB variables that contain multiple elements.

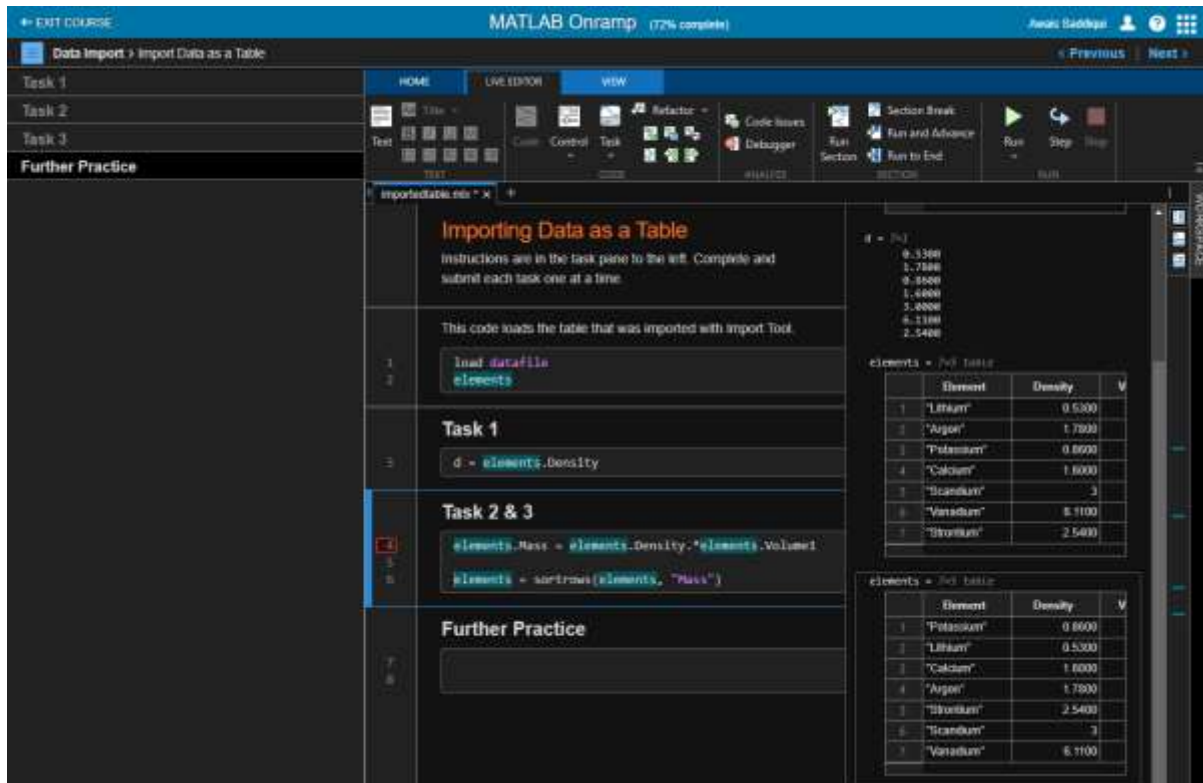


Remarks:

In this section, I learned how to enter manually arrays and creates arrays with functions.

4. Importing Data:

- a. **Objective:** Bring data from external files into MATLAB.



The screenshot displays the MATLAB Onramp interface for a task titled "Importing Data as a Table". The interface includes a task pane on the left with sections for "Task 1", "Task 2", "Task 3", and "Further Practice". The main workspace shows the following code:

```
1 load datafile
2 elements
3
4 Task 1
5 d = elements.Density
6
7 Task 2 & 3
8 elements.Mass = elements.Density.*elements.Volume1
9 elements = sortrows(elements, "Mass")
10
11 Further Practice
```

On the right, two tables are displayed. The first table, titled "elements = 7x3 table", shows the following data:

	Element	Density
1	"Lithium"	0.5300
2	"Argon"	1.7800
3	"Potassium"	0.8600
4	"Calcium"	1.6000
5	"Scandium"	3
6	"Vanadium"	6.1100
7	"Strontium"	2.5400

The second table, also titled "elements = 7x3 table", shows the following data:

	Element	Density
1	"Potassium"	0.8600
2	"Lithium"	0.5300
3	"Calcium"	1.6000
4	"Argon"	1.7800
5	"Strontium"	2.5400
6	"Scandium"	3
7	"Vanadium"	6.1100

Remarks:

How to import data from external files to MATLAB.

5. Indexing into and Modifying Arrays:

- Use indexing to extract and modify rows, columns, and elements of MATLAB arrays.

The screenshot shows the MATLAB Onramp interface for the 'Changing Values in Arrays' task. The interface is divided into several sections:

- Task Panel (Left):** Contains instructions and code input fields for Task 1, Task 2, Task 3, and Further Practice.
- Code Editor (Center):** Displays the MATLAB code being executed, including comments and task-specific instructions.
- Command Window (Right):** Shows the output of the MATLAB code, including the 'data' matrix and the results of the indexing operations.

Task 1: The code sets up the interaction by loading a data file. The output shows a 4x4 matrix 'data' with values ranging from 1.0000 to 4.4500.

Task 2: The code extracts the first column of the data matrix into a vector 'v2'. The output shows the first column of the data matrix.

Task 3: The code modifies the first element of the vector 'v2' to 0.5. The output shows the modified vector 'v2'.

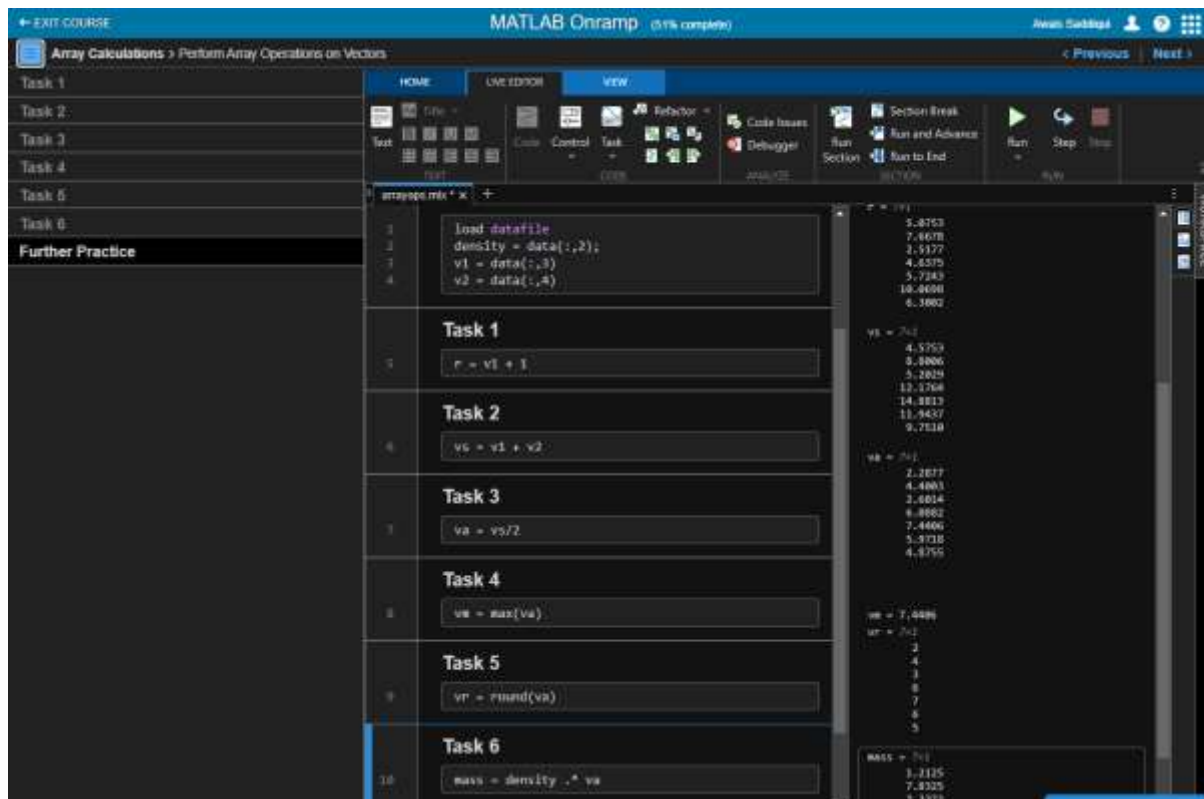
Further Practice: The code modifies the first element of the first column of the data matrix to 0.5. The output shows the modified data matrix.

Remarks:

I learned indexing, index into arrays , extract multiple elements and change values in arrays.

6. Array Calculations:

- a. **Objective:** Perform calculations on entire arrays at once.

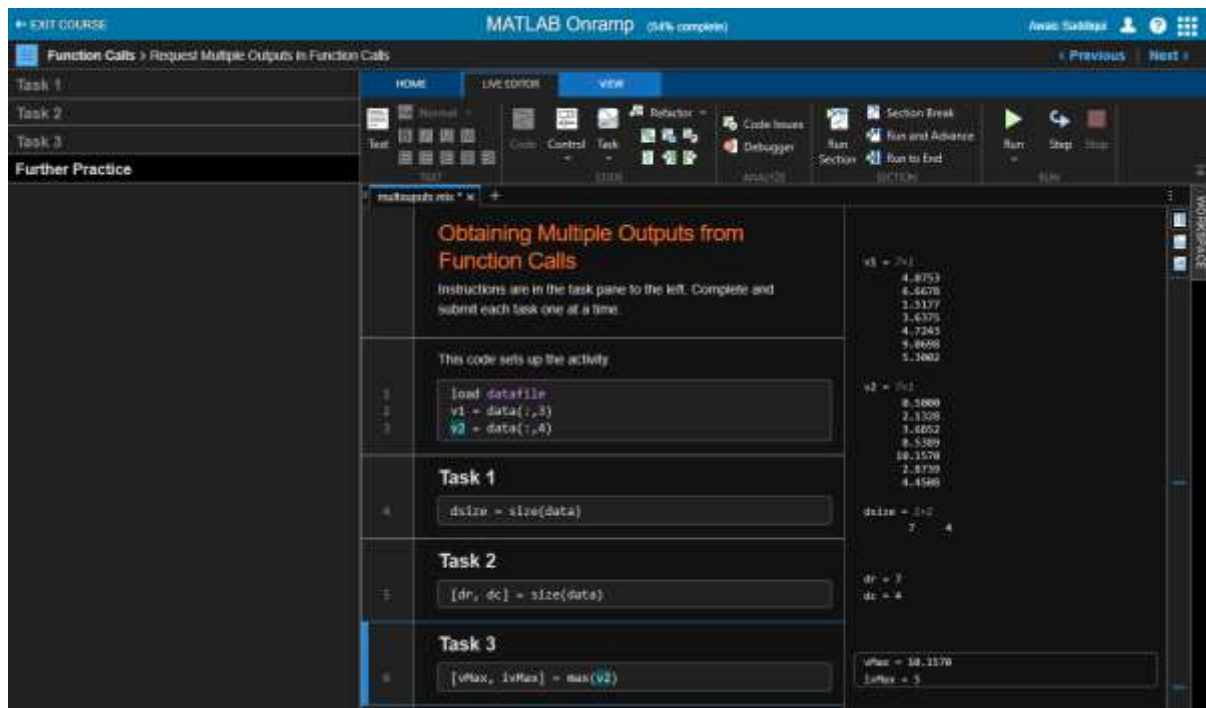


Remarks:

How to perform array operations on vectors.

7. Calling Functions:

- a. **Objective:** Call functions to obtain multiple outputs.



Remarks:

I learned, How to obtained multiple outputs from function calls.

8. Obtaining Help:

Objective: Use the MATLAB documentation to discover information about MATLAB features.



Remarks:

I learned how to MATLAB documentation.

9. Plotting Data:

Visualize variables using MATLAB's plotting functions.

The image displays two screenshots of the MATLAB Onramp interface, specifically the 'Plots > Plot Vectors' section. The interface includes a task pane on the left, a central code editor, and a right-hand plot area.

Top Screenshot:

- Task 1:** `plot(sample, mass1)`
- Task 2:** `plot(sample, mass2, "r+")`
- Task 3:** `hold on` followed by `plot(sample, mass1, "ks")`
- Task 4:** (No code entered)

The plots show a line graph of mass1 vs sample (Task 1) and a scatter plot of mass2 vs sample (Task 2). Task 3 shows the two plots overlaid.

Bottom Screenshot:

- Task 2:** `plot(sample, mass2, "r+")`
- Task 3:** `hold on` followed by `plot(sample, mass1, "ks")`
- Task 4:** `hold off`
- Task 5:** `plot(v1)`
- Task 6:** `plot(v1, "linewidth", 1)`
- Task 7:** `plot(sample, v1, "ro-", "linewidth", 4)`

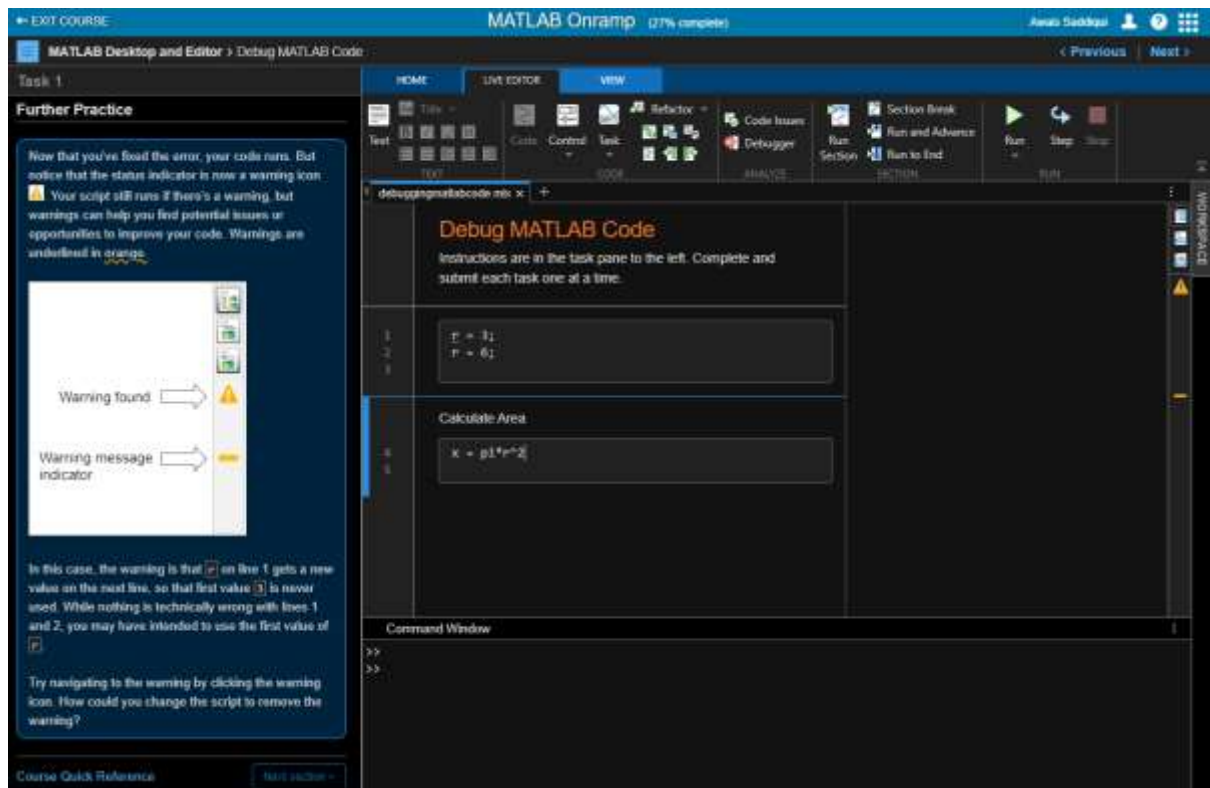
The plots show a line graph of mass2 vs sample (Task 2), a line graph of mass1 vs sample (Task 3), a line graph of v1 vs sample (Task 5), a line graph of v1 vs sample with a linewidth of 1 (Task 6), and a line graph of v1 vs sample with a linewidth of 4 (Task 7).

Remarks:

In this section I learned how to plot vectors and annotate vectors.

10. MATLAB Scripts:

Objective: Write and save your own MATLAB programs

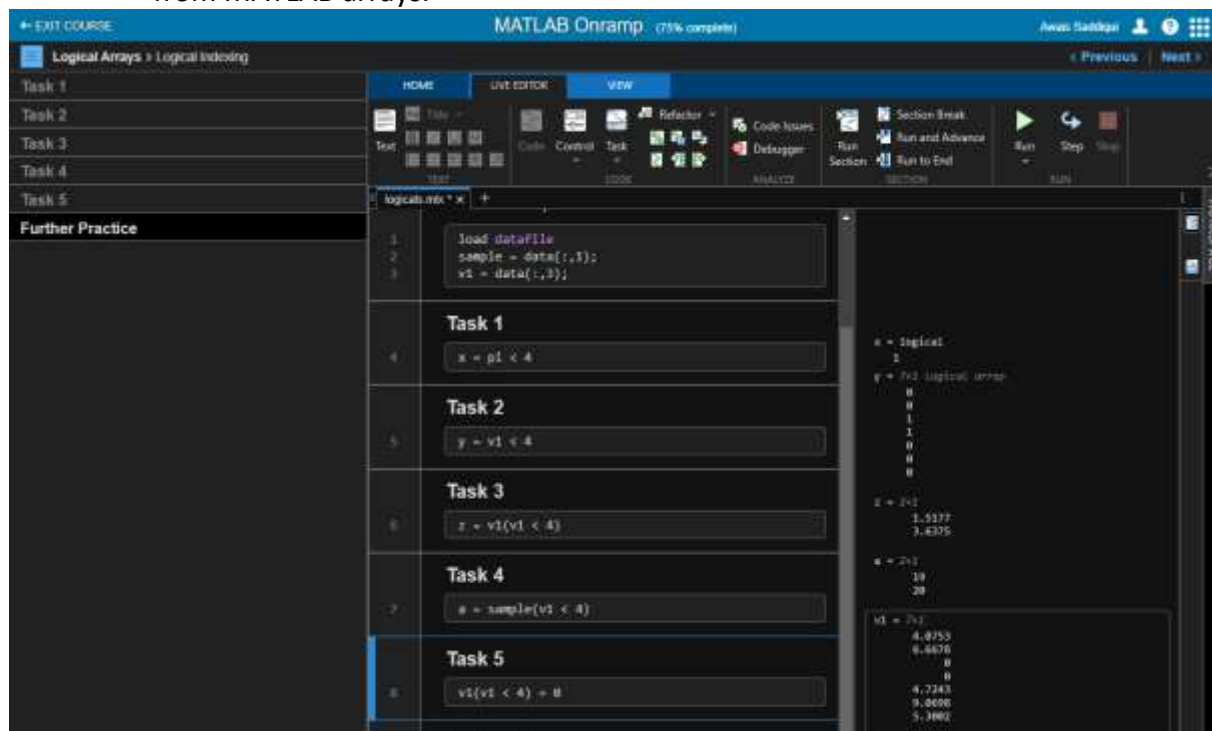


Remarks:

How to write and save code in MATLAB.

11.Logical Arrays:

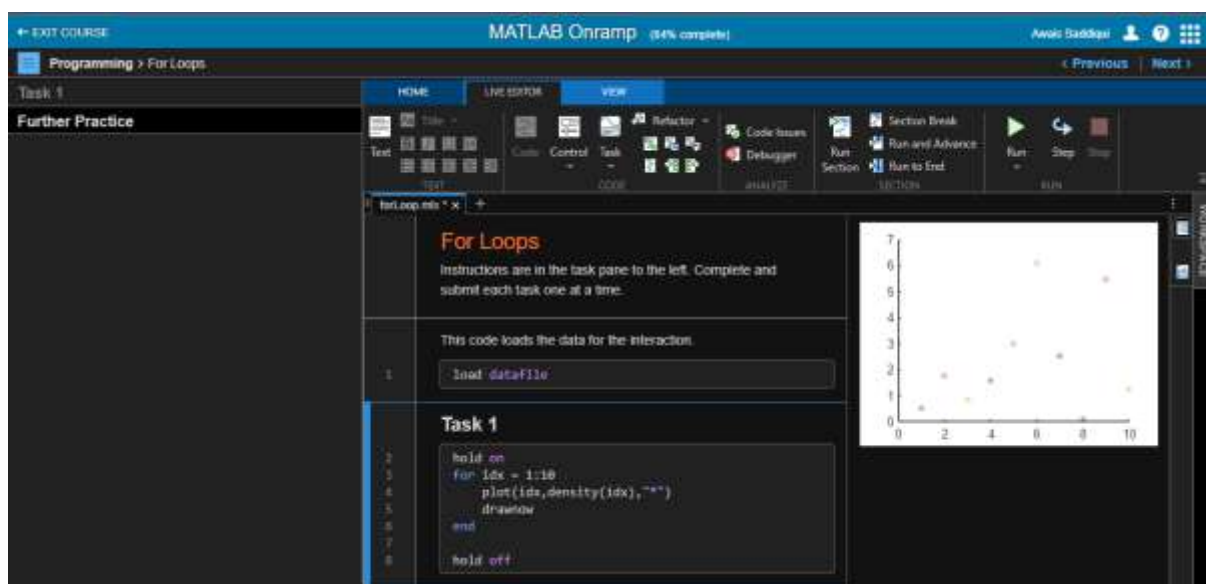
Objective: Use logical expressions to help you to extract elements of interest from MATLAB arrays.



Remarks: I learned how to logically index arrays.

12.Programming:

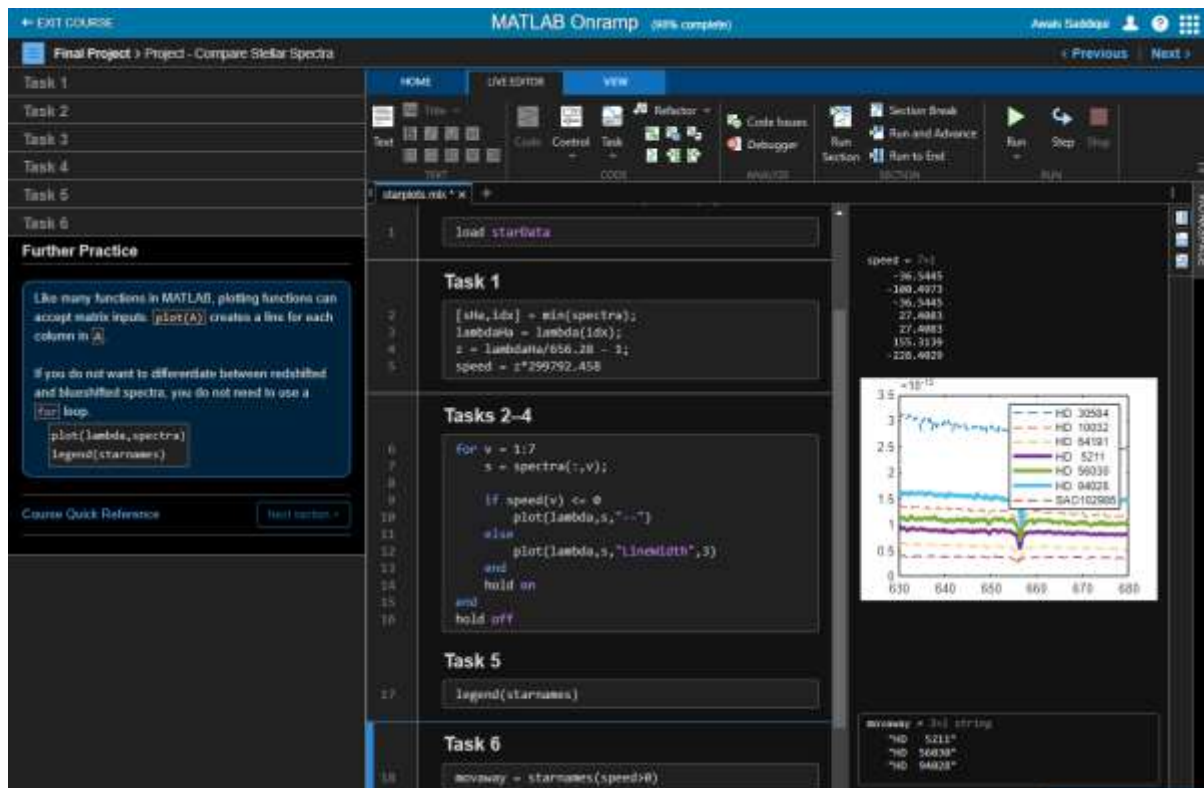
Objective: Write programs that execute code based upon some condition.



Remarks: In this section I learned decision branching and for loops.

13.Final Project:

Objective: Bring together concepts that you have learned with a project.



Remarks:

In project Steller Motion, when the star is moving away from earth then find It's wavelength and in second project compare stellar spectra find the speed at which star is moving away.

14.MathWorks Certificate:

