**INTRODUCTION TO MATLAB**

**Lab Report # 01**



**CSE301 - L Signals & Systems Lab**

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Class Section: A

Submitted to:

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**Department of Computer System Engineering**

**UET Peshawar**

**301L: Signals & Systems Lab**

**LAB ASSESSMENT RUBRICS**

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| --- | --- | --- | --- | --- |
| **Marking Criteria** | **Exceeds expectation (5-4)** | **Meets expectation** **(3-2)** | **Does not meet expectation (1)** | **Score** |
| **1. Realization of Experiment** | Program compiles (noerrors and no warnings).  Program always works correctly and meets the specification(s).  Completed between 71-100% of the requirements. | Program compiles (no errors and some warnings).  Some details of the program specification are violated, program functions incorrectly for some inputs.  Completed between 41-70% of the requirements. | Program fails to or compile with lots of warnings.  Program only functions correctly in very limited cases or not at all.  Completed less than  40% of the requirements. | 30% |
| **2. Ability to apply required code utility or data structure** | Able to apply required data type or data structure and produce correct results. Familiarize and selects proper functions for simulation of given problem using  software tools like  MATLAB. | Able to apply required data type or data structure but does not produce correct results. Need guidance to select proper functions for simulation of given problem using  software tools like  MATLAB. | Unable to identify required data type or data structure.  Incapable of selecting proper functions for simulation of given problem using software tools like MATLAB. | 20% |
| **3. Documentation** | Clearly and effectively documented including descriptions of all variables/functions. Specific purpose is noted for each function, control structure, input requirements and output results. | Basic documentation including descriptions of all variables/functions. Specific purpose is noted for each function and control structure. | No documentation included. | 10% |
| **4. Ability to run/debug** | Executes Matlab codes without errors, excellent user | Executes Matlab codes without errors.  User prompts are | Does not execute Matlab codes due to errors. | 20% |

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| --- | --- | --- | --- | --- |
|  | prompts, good use of symbols, spacing in output.  Thorough and organized testing has been completed and output from test cases is included. | understandable, minimum use of symbols or spacing in output.  Some testing has been completed. | User prompts are misleading or nonexistent.  No testing has been completed. |  |
| **5. Results compilation** | Show processed results effectively by conducting simple computations and plotting using collected data | Show processed results effectively by conducting simple computations and plotting using collected data with minor error | Unable to show processed results effectively by conducting simple computations and plotting using collected data with minor error | 10% |
| **6. Efficiency** | Excellent use of CPU and Memory. | Good but not smart use of CPU and Memory. | Inefficient use of CPU and Memory. | 10% |
| **7. Lab**  **Performance (Team work and Lab**  **etiquettes)** | Actively engages and cooperates with other group members in an effective manner. Respectfully and carefully observes safety rules and procedures | Cooperates with other group members in a reasonable manner. Observes safety rules and procedures with minor deviation. | Distracts or discourages other group members from conducting the experiment. Disregards  safety rules and procedures. | 10% |

**Instructor:**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**WHAT IS MATLAB:**

MATLAB is a commercial MATRIX LABORATORY package. MATLAB is a high-level programming language and computing environment used for numerical analysis, data visualization and programming. It is widely used in engineering, science and mathematics fields. MATLAB allows users to perform complex mathematical calculations and data analysis tasks with ease as well as develop and deploy algorithms and models for a variety of applications.

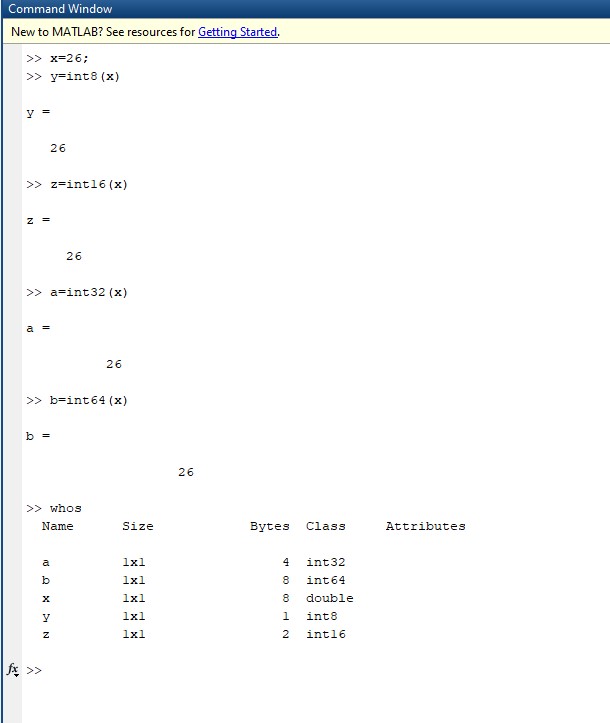
**Lab objectives:**

MATLAB will be used extensively in all the succeeding labs. The goal of this first lab is to gain familiarity with MATLAB and build some basic skills in the MATLAB language. Some specific topics covered in this lab are:

* Introduction to MATLAB.
* MATLAB Environment (command window, editor, workspace, working folder)
* MATLAB Help
* Variable arithmetic
* Built in Mathematical Functions
* Input and display
* Timing functions (clock, Tic Toc, etime).
* Introduction to M‐files (scripts etc.)

**-------------------------TASK 01--------------------------**

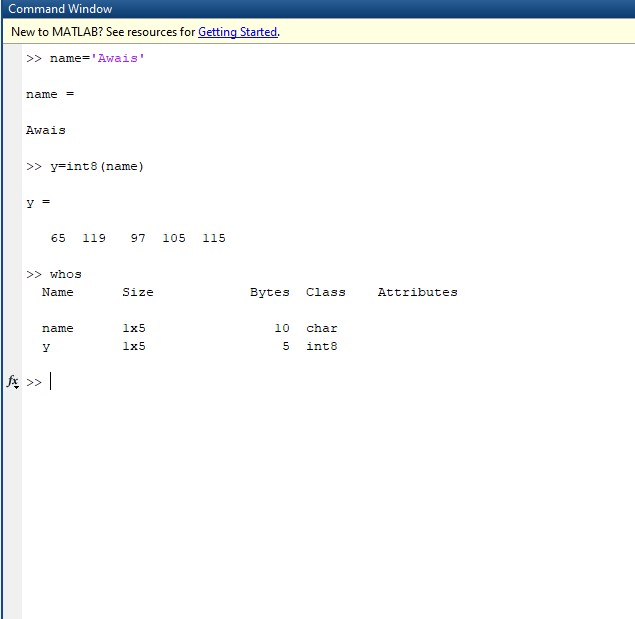
1. MATLAB stores numeric data as double‐precision floating-point by default. To store data as an 8‐ bit integer, int8 (a conversion function) can be used. Type the sample code in MATLAB command window: >> x = 26 >> whos >> y = int8(x) >> whos What difference do you see? State your findings. (Also try uint16, uint32, uint64).

**Code and Output:**

**-------------------------TASK 01--------------------------**

b). Take your name in the command window e.g. name = ‘Ali’. Convert it into 8‐bit integer format using the int8 function.

**Code and Output:**

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**-------------------------TASK 01--------------------------**

c). Use the formatting commands present in MATLAB to convert the system Clock to whole numbers rather than floating points.

**Code and Output:**

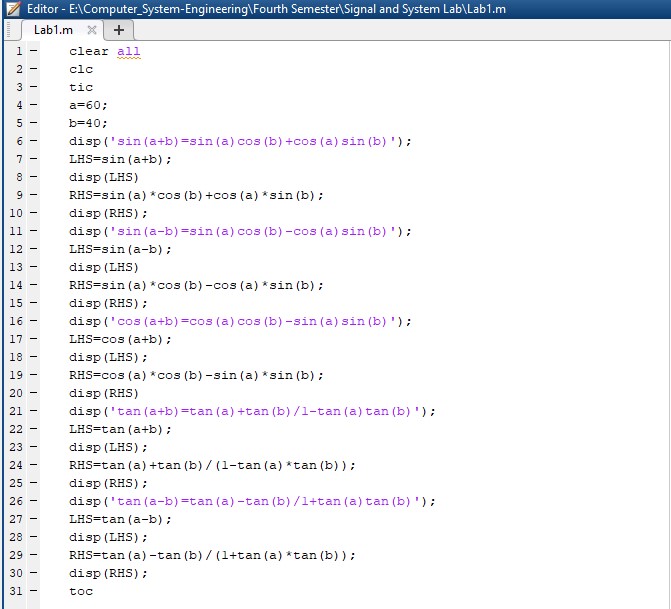
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**-------------------------TASK 02--------------------------**

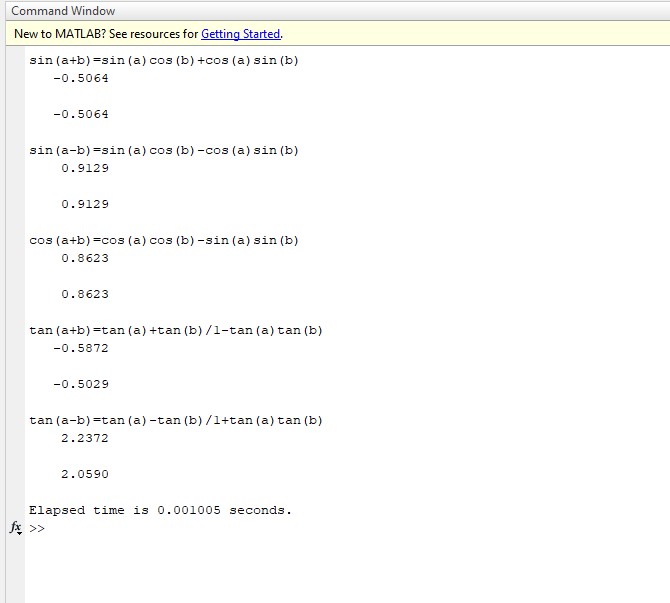
Create an M-File to prove any five expressions from the following:

Use etime or tic toc functions to evaluate time taken for solving each of the five chosen expressions.

**MATLAB Code:**

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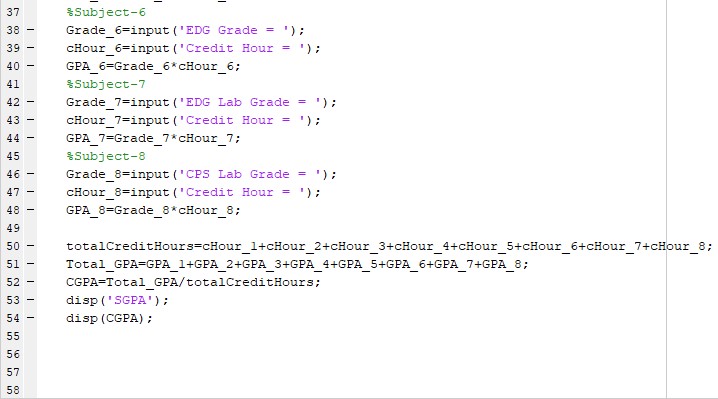
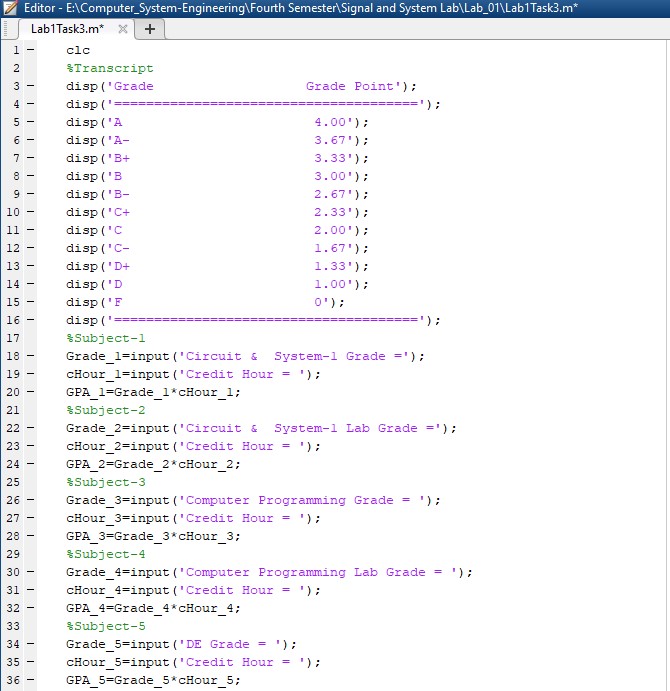
**Task-2 Output:**

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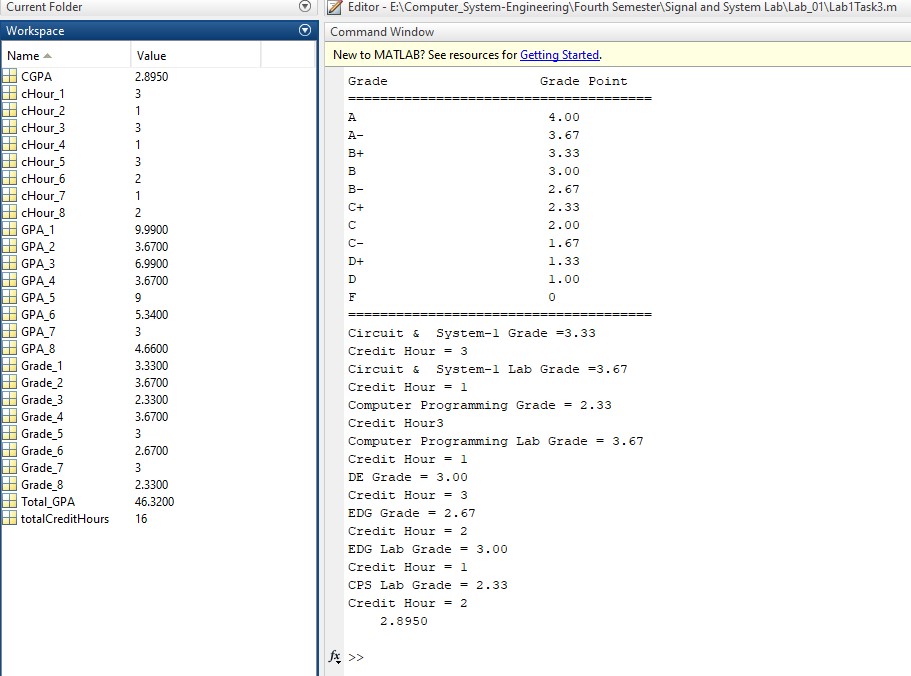
**-------------------------TASK 03--------------------------**

Write a CGPA Calculator program using M-File: Design a transcript for your second-semester result i.e. take grade points and credit hours of each subject as input from user and store in variables. Take the product of each subject grade points with its credit hours and divide by total 13 credit hours in order to evaluate CGPA. Show the results in the form of well-designed transcript using disp and input commands. Use the following table to display equivalent grades for each grade point:

**Code:**

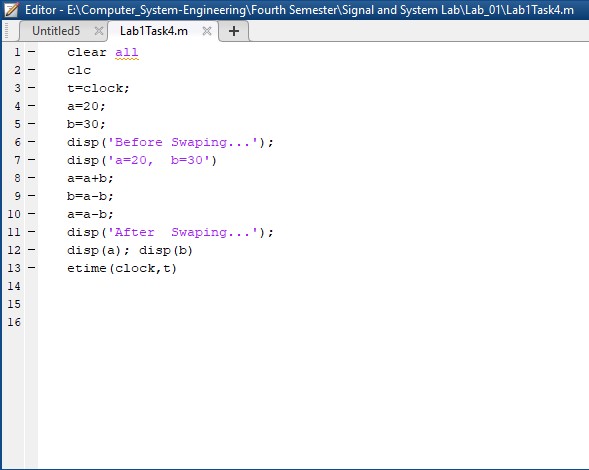
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**Task-3 Output:**

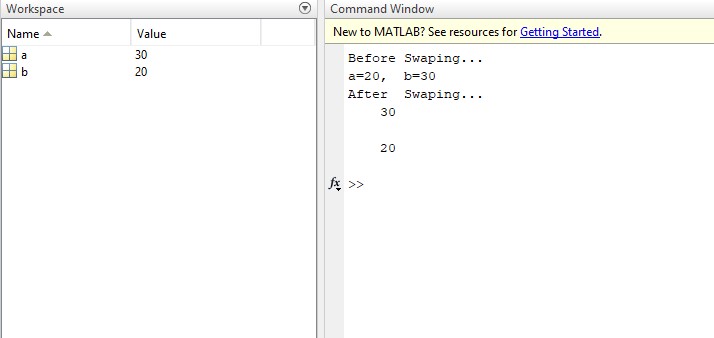
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**-------------------------TASK 04--------------------------**

Write a simple code to swap the values of two variables of double type using M-file. Create the logic in such a way that no third variable is used. Show the etime for this code.

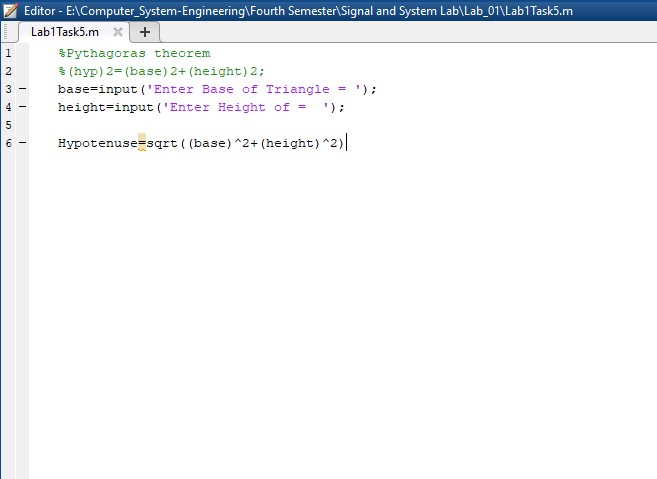
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**Task-4 Output:**

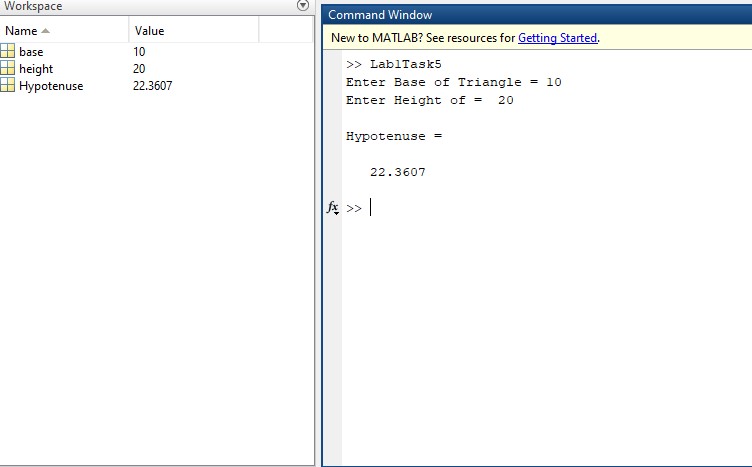
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**-------------------------TASK 05--------------------------**

Implement the Pythagoras theorem in MATLAB that takes input from the user.

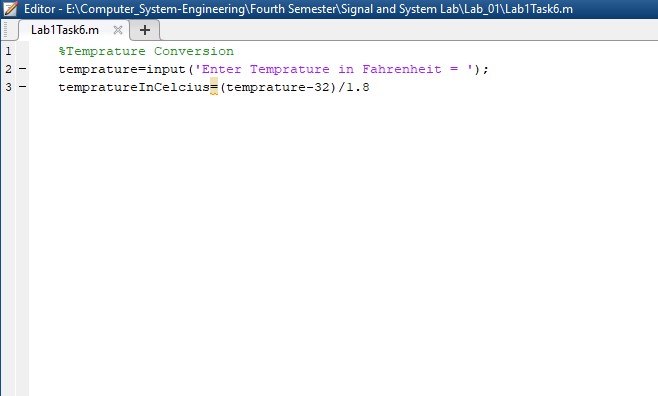
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**Task-5 output:**

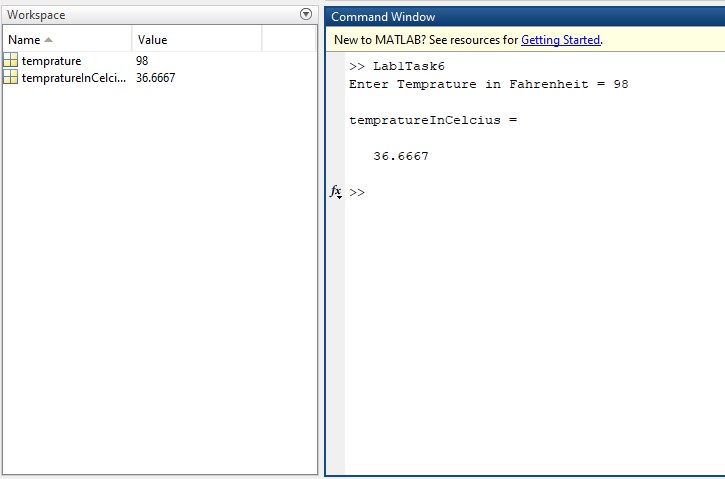
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**-------------------------TASK 06--------------------------**

Implement a temperature conversion scenario in MATLAB that takes the temperature from the user in Fahrenheit and displays the output in Centigrade.

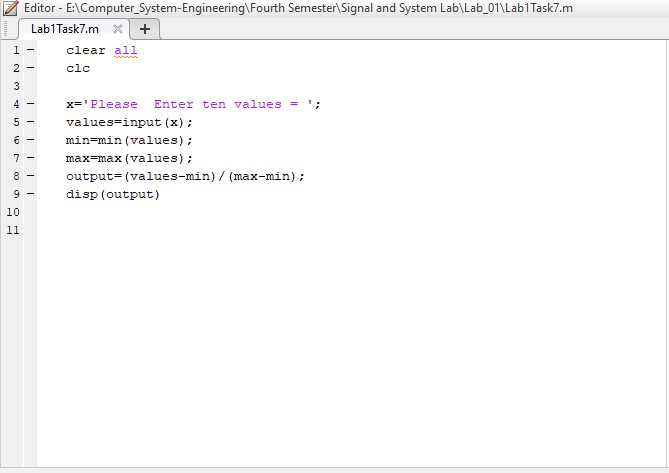
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**Task-6 Output:**

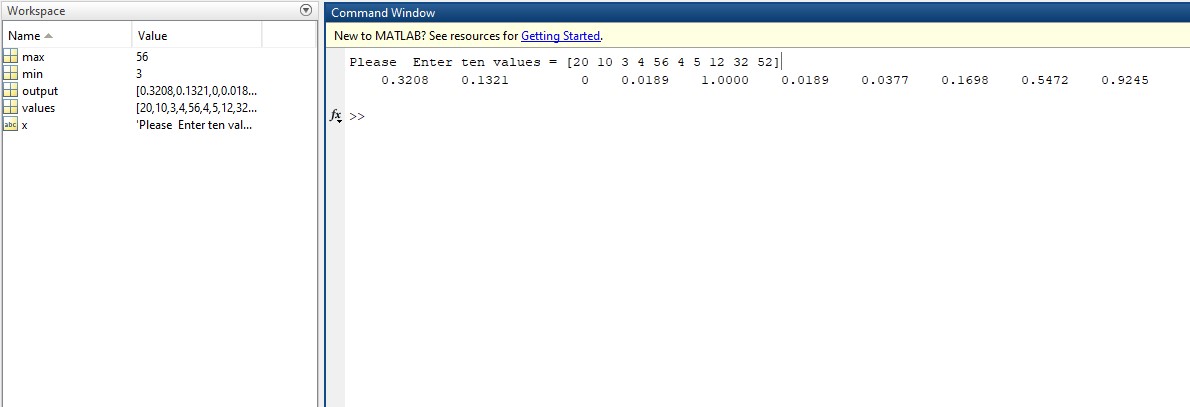
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**-------------------------TASK 07--------------------------**

Devise an algorithm in MATLAB that takes ten inputs from the user and normalizes them between [0-1]. Hints: Find the pair-wise max (maxi) and min (mini) of ten numbers using the max and min built-in command. Find the normalized value for each input using formula (input-mini)/(maxi-mini). Note: Do not use loops or if else structures.

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**Task-7 Output:**

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