

Name : _____

Class Number: _____

ENGR 11: Lesson 1, Part 3 Suggested Problems

Theoretic Problems: Discussed in notes

1. Scratch paper versus word processing

- A. Why is MATLAB's Command Window not a great tool to execute a series of sequential commands?
 - B. Why are .m script files more efficient and effective than the Command Window for executing sequential commands?
 - C. Develop an analogy for yourself on how you will remember the differences in benefits and drawbacks of the Command Window and script files.
 - D. Why might you want to undock the Editor Window when working on script files?
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2. Elements of Documentation Style

- A. What guidelines should you follow in this class when writing script files? In particular, below is a list of characteristics that your script files should exhibit:
 - Choose a descriptive script file name.
 - Include title information in the script file.
 - Provide clear Help documentation.
 - Provide author and version information.
 - Execute error checking inside the program where ever needed.
 - Include fully descriptive and clear error messages.
 - Write clear and extensive comments (but don't over comment).
 - Make every comment count: don't just echo the code with your comments.
 - Use variable names that mean something.
 - Format your program to help the reader understand it.
 - Use parenthesis to avoid ambiguity.
 - Avoid bad or lazy code.
- B. Explain why you might be willing to believe the following statement: "The work we do to make our code easy to read and understand is valuable not only because it helps us develop cogent thinking habits but also because such code can be easily used by other people." If possible, please connect this statement to your current dreams for your future career.
- C. Please create a document (using your favorite word processing software) called *The Elements of Programming Style*. In that document, type each of the characteristics above. For each item on the list above, come up with a short description of what this item means to you. Put this document in a special place and refer back to it often, adding new ideas as you encounter them.

Problems Solved in Jeff's Notes

3. Create a script file by navigating to the Home tab of the MATLAB Toolstrip, clicking the “New” icon, and selecting the “Script” item from the corresponding drop-down menu.
 - A. Identify the exact location of the Editor Window that automatically opened when you created this new script file.
 - B. Identify the three new *Context* tabs that appear on the top of the MATLAB Desktop upon opening the Editor Window.
 - C. Dock and undock the Editor Window using both your mouse and keyboard short cuts.
 - D. While the Editor Window is Docked, activate and deactivate the Editor Window by clicking on the appropriate Windows in the MATLAB Desktop.
 - E. Identify the line numbers in your new script file. Make a number of new lines by pressing and observe how the line numbering changes. Delete these new lines and observe what happens.
 - F. When editing a script file, what visual indicator can you use to figure out if you have saved your recent work on this script file?
 - G. Save your script file by either single clicking on the Save icon in the Editor Tab of the Toolstrip or using the appropriate keyboard shortcut (please know how to save using both mechanisms).
 - H. How many rules are there for naming script files? Identify each of these rules. How are these similar to the rules for naming MATLAB variables?

4. Eg. Write a script file that calculates the roots of a quadratic equation. In doing so, follow all relevant guidelines from our list of desirable characteristics i. - xii. in Theoretical Problem 2 above.

5. What is the main purpose of the MATLAB Toolstrip? When we first open MATLAB, what are the four *Global* tabs that appear on to of the Toolstrip in the MATLAB Desktop?

6. Identify the five sections that appear under the Home tab in the MATLAB Toolstrip. Using your own words, give a brief description of the general functionality of the tools found in each section.

7. What is the Current Folder in MATLAB? What are a list of four synonyms that refer to this folder?
8. Identify the Current Folder Toolbar in the MATLAB Desktop. Using this Current Folder Toolbar, do each of the following:
 - A. Identify the exact path for your Current Folder at this moment in your MATLAB session.
 - B. Click the “Path Name” button to produce a string of the path name for the current folder.
 - C. Click the “Up One Level” button to navigate one level up in your computer’s file system.
 - D. Click the “Browse for Folder” button to set a specific location for the Current Folder.
 - E. Click on any of the small rightward pointing triangles to get a list of all folders in a particular directory within the path to the current folder.

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9. Below is a list of some popular commands to learn more about or change the location of the current folder in MATLAB

`pwd` `ls` `dir` `what` `cd`

Please (briefly) describe what outcome results from executing each command in the Command Window.

- A. Use the `pwd` command and interpret the output properly
- B. Use the `ls` command and describe what results
- C. Use the `dir` command and describe what results
- D. Use the `what` command and describe what results
- E. Use the `cd` command to change the current folder in the command line

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10. Navigate to the Preferences icon in the Environment section of the Home Tab in the MATLAB Toolstrip. Open the Preferences Window. Then, change some of the default MATLAB Color Preferences to any color(s) that make you smile. Close the Preferences Window, look at the effect of the changes you made, and then smile. Now, Restore Default Colors.

Suggested Problems

In the problems below, you will be creating script files. I expect your work to reflect the appropriate guidelines set out in Lesson 1, Part 3 Theoretical Problem 2A seen above. In other words, your work reflect a programmer in construction mode not sandbox mode. The code you create should demonstrate professional-grade formatting and organization. The point of these exercises is to show that it takes work to write good code, even if that code solves a relatively “easy” problem.

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11. Create a new script file using keyboard short cuts on the computer you’re using. Then, save this file into your working directory. Now, recall the Law of Cosines which states:

If we know the lengths of two sides of a triangles (a and b) and the angle between these two sides, denoted as θ , then we can calculate the length of the third side c using the following equation

$$c^2 = a^2 + b^2 - 2 \cdot a \cdot b \cdot \cos(\theta).$$

Write a simple script file that implements the law of cosines. In particular, assign values for the variables a , b , and θ . Then, using these variables, assign the length of the third side of the triangle to a third variable. In writing this script file, please follow all relevant guidelines from our list of desirable characteristics i. - xii. in Theoretical Problem 2 above.

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12. Recall that greatest common divisor of two numbers $a, b \in \mathbb{N}$ is the largest positive integer that divides both positive integers a and b . On the other hand, the least common multiple of a and b is the smallest number that is divisible by both a and b . For example, the greatest common divisor of 36 and 24 is 12 while the least common multiple of these two numbers is 72. Use your memory of MATLAB’s Elementary Math functions and the MATLAB Help Window to write a script file that uses built-in MATLAB functions to do each of the following:
- A. Find the least common multiple of a and b
 - B. Find the greatest common factor of a and b
 - C. Find the prime factors of the least common multiple of a and b