

# Mastery Assignment #7 Basics

## Fall 2022

### Matthew Woodring

This file contains the basics of the seventh mastery assignment. It is intended to provide a basic overview of the assignment and help with any tricky parts.

#### **General Overview:**

- Submit your code on Zybooks in the “36. Mastery Assignment #7” section
- All code is automatically graded by Zybooks
- You can submit your code as many times as needed before the deadline
- The assignment is due Sunday, November 13<sup>th</sup>, 2022 by 11:59pm
- No late work is accepted
- There are no known errors in the grading script as of October 31<sup>st</sup>, 2022

#### **Problem 1:**

##### **Task 1:**

- Recall that all sides of a square must have an equal length
- You do not need any ‘if’ statements

##### **Task 2:**

- Using a nested loop here is a great idea
- The ‘mod’ function will be useful here
- The ‘ceil’ and ‘floor’ functions will be useful here
- You don’t have to use the ‘ceil’ and ‘floor’ functions if you can come up with the mathematical formula the two functions use behind the scenes (one line of code each)

##### **Task 3:**

- Using a logical here is a great idea
- Using a nested loop here is a great idea
- The ‘mod’ function will be useful here
- The ‘sprintf’ function will be useful here

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**Task 4:**

- I recommend checking each of the three bullet points first, then classifying the square
- For checking the row/column sums, the 'sum' and 'all' functions will be useful
- For checking the diagonal sums, the 'flip' function will be useful
- There is a built-in function in MATLAB that makes summing the diagonals possible in one line (per diagonal); can you figure out what it is?
- For checking the sequence of numbers, the 'sort' function will be useful
- Recall how to transpose a matrix; it may be useful here
- Don't forget your control loop should repeat the entire program!

**Problem 2:**

**Task 1:**

- Remember, for this problem, you can only use the functions listed in the prompt and cannot use implicit loops!
- Think about how you can determine if an input is a scalar, vector, or matrix
- The 'size' function will be useful here
- The 'isvector', 'isstring', and 'isnumeric' functions will be useful here

**Task 2:**

- Remember, for this problem, you can only use the functions listed in the prompt and cannot use implicit loops!
- There are many different sorting algorithms you can choose to sort the list including: quick sort, merge sort, selection sort, insertion sort, and bubble sort
- I used selection sort because it is easy to implement and has a decent time complexity for small lists (the time complexity is horrible for large lists, though)
- I highly recommend looking into the different sorting algorithms and picking the one that makes the most sense to you; do not worry about efficiency
- Remember, you have to keep both lists associated with each other (i.e. if you move an item in the start times input, you must also move its associated process name)

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#### **Task 3:**

- Remember, for this problem, you can only use the functions listed in the prompt and cannot use implicit loops!
- A 'for' loop will be useful here
- Remember, you can change the step-size (how much the iterator increases on each iteration) of your 'for' loop

Mastery Assignment #7 is likely one of the easier MA's you encounter during the second half of the course. It is more of a pure computer science problem than an engineering problem. The concepts covered in this MA (most notably nested loops) have important applications in many classes here at UH and in the real world. The efficient sorting of lists is used in almost every industry you can think of. Please make sure you can complete all of MA7 by yourself without the aid of notes or other people. Also, before the final exam, make sure you can complete MA7 in the recommended proficiency time of 30 - 50 minutes for Problem #1 and 35 - 60 minutes for Problem #2.