

PNI Intro to Matlab 2024

Week 2 Problem Set

Make a new MATLAB script (.m file) and code your answers to each question as a separate section (use %% to designate a new section). If a question asks you to write a function, write it in a separate script and call it in the main script. Make sure to submit all the scripts you write.

- 1) Create two 3x3 matrices consisting of random integers.
 - a. Concatenate these two matrices horizontally. Print the dimensions of the resulting matrix.
 - b. Concatenate these two matrices vertically. Print the dimensions of the resulting matrix.
- 2) Write a function which takes the radius of a sphere as its input and returns the surface area and volume of the sphere as outputs. Name this function ``surfarea_and_volume`` and use it to calculate and the surface area and volume of a sphere with radius 4.
- 3) Write a function that takes an array as its input and returns its three highest elements, sorted in a new array from highest to lowest. Name this function ``max_3`` and use it to find the three maximum elements of an array generated by `randi(7, 1, 6)`. Print the result.
- 4) For the ``max_3`` function from question 3, you will get an error if you input a two-element array. Make a new function, ``max_3_better``, that prints a message telling the user the issue with their input if they call the function with an input containing fewer than three elements. If their input has three or more elements, it should run as before. Run the function once with a random 2-element array and once with a random three-element array and print the results.
- 5) Write a function named ``max_3_div`` that takes in two arrays as its input. This function should first calculate the elementwise division between these two arrays, and then return the maximum three elements of the resulting array as its output. You should be calling a previous function you've already written within the code for ``max_3_div``. Run this function with two random, seven-element arrays and print the output.
- 6) Write a function that takes two integers as inputs and prints different messages (make up your own!) depending on if the first integer is greater than, less than, or equal to the second integer. Name this function ``exercise_6`` and print the outputs to ``exercise_6(4, 5)``, ``exercise_6(5, 4)``, and ``exercise_6(5, 5)``.
- 7) Generate a random array consisting of eight integers. Write some code (it doesn't have to be in a function) that goes through each element of the array and prints "I am divisible by 4" if the element is divisible by 4, "I am not divisible by 4" if it is not divisible by 4, and "I am 4" if the element is equal to 4.
- 8) Write a function that takes an array of angles in degrees as its input and returns an array of those same angles converted into radians as its output. Run it with the array `[0, 23, 90, -45, 175, 265, 801, -30, 360]` and print the output. The formula for this is:

$$\text{radians} = \text{degrees} * \pi/180$$