Programming 1: Lab 8 : Lists and Tuples

Write the python code for the following questions. Handle all the valid and invalid test cases. Write down relevant comments in your code:

1. Write programs for the following by taking list of integers of arbitrary length as user input. Do not use any inbuilt list functions other than len().
    1. Find the sum of the elements in the list.
    2. Find the product of the elements in the list.
    3. Find the largest element in the list of integers.
2. Take a list of integers as input and sort the elements of the list by taking another list and incrementally appending values in the 2nd list. (Do not use the inbuilt sorting function).
3. Take a list of integers as input and sort the elements of the list in-place, i.e., do not use any other list for storing the result, only the values in the list are swapped to form the sorted list. (Do not use the inbuilt sorting function).
4. Represent 2D matrix of dimensions M x N, by taking M, N and matrix elements as input from the user. Perform following operations on these 2D matrices.
    1. Add 2 matrices. Display the values in the input matrices as well as the summation matrix.
    2. Multiply 2 matrices. Note that the input matrices need to be checked for compatible multiplication, i.e., 2 matrices with M x N and N x P dimensions can be multiplied, if number of columns in 1st matrix is equal to the number of rows in the 2nd matrix. Consider all the valid and invalid test cases and display the results.
5. Use list comprehensions for the following.
    1. Take a list of strings as input along with a sample string. Count the number of strings that contains the sample string as a substring.
    2. Take a list of integers as input. Find the square of only the +ve integers in the list, the rest are converted to 0s.
    3. Take a list of integers as input. Find the square of numbers that are in the range of 10-20, leave the rest as they are in the resultant list.
    4. Take a list of strings as input, convert all the strings into upper case, if they have the first character as lower case, leave the rest as they are.
6. Create a list of student record by taking the student name, rollno and total marks (out of 100) as input.
    1. Display the details of the student, who has the maximum marks
    2. Add an element to each student record corresponding to their Rank. The rank for student with highest marks is 1, and with lowest marks is N. Display the student details in ascending order of their ranks.