BITS Pilani, K. K. Birla Goa Campus
Data Structures and Algorithms (CS F211)

Lab 1 (19/01/2024)

Total Marks: 6
Time Limit: 1 Hour 40 minutes

Question 1 (6 marks)

Implement MERGE-SORT algorithm by modifying the *template code* `L1_Q1_2021A7PS9999G.cpp` that is provided. Modify the roll number part of the file name. The `main` function of the given template program reads a sequence of integers. The first integer is the size n of the input array. The remaining integers form the input array $A[0..n-1]$. Do not modify the `main` function.

Use the following sequence of commands to compile and run the program.

```
:~$ g++ L1_Q1_2021A7PS9999G.cpp
:~$ ./a.out < L1_Q1_T1_input.txt
```

The `./a.out < L1_Q1_T1_input.txt` command reads input from the `L1_Q1_T1_input.txt` file. This file contains the input for the test case `T1`. The output for the test case `T1` is provided in `L1_Q1_T1_ouput.txt` file.

MERGE-SORT divides a problem into two subproblems. You must print all the elements in a subproblem *after* the call to the `merge` procedure (see the template code). You must print the elements only in those subproblems that contain *at least* two elements. You need to modify the `merge` and `mergeSort` functions such that the output of each testcase `Ti` matches the corresponding expected output given in `L1_Q1_Ti_ouput.txt` file.

Use the following command too check whether your program passes a testcase `Ti`:

```
:~$ ./RunTestCase.py L1 Q1 2021A7PS9999G T1
```

The `RunTestCase.py` program expects four command line arguments. Instead of `2021A7PS9999G`, use your own roll number while running the above command. `L1`, `Q1` and `T1` in the above command refer to Lab 1, Question 1 and Test case 1 respectively.

Modify your program suitably so that it passes all the three testcases — `T1`, `T2` and `T3`. Be mindful about the extra space before the return (end-of-line) character in the expected output file.

You can create your final submission file (zip file) using the following command:

```
:~$ ./CreateSubmission.py L1 2021A7PS9999G
```

Upload the zip file created by the above command on local quanta: `https://quanta.bits-goa.ac.in/`. If you don't have an account on local quanta, talk to the IC *after* creating the submission zip file.