

# ESS101 : Programming 1 (C Programming)

## LAB - 5

Due: 16th September, 2019 @ 23:59

**Note:** For the following questions, consider the range of input numbers to be from  $-2^{40}$  to  $2^{40}$ . Output the sorted numbers separated by a space.

**Problem 1:** (Bubble Sort) Write a (C) program to input comma separated 20 integers and store them in an array, use a Bubble sort function to sort the integers in increasing order. Print the sorted numbers, also output the number of swaps and comparisons while performing the search in a new line.

**Sample Input:** 20,19,18,17,16,15,14,13,12,11,10,9,8,7,6,5,4,3,2,1

**Output line 1:** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

**Output line 2:** 190 190

**Problem 2:** (Selection Sort) Write a (C) program to input comma separated 20 integers and store them in an array, use a Selection sort function to sort the integers in increasing order. Print the sorted numbers, also output the number of swaps and comparisons while performing the search in a new line.

**Sample Input:** 20,19,18,17,16,15,14,13,12,11,10,9,8,7,6,5,4,3,2,1

**Output line 1:** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

**Output line 2:** 19 190

**Problem 3:** (Merge Sort) Write a (C) program to input  $n$  comma separated integers and store them in an array, use a Merge sort function to sort the integers in increasing order. The first line of input is  $n$  and the next line contains  $n$  comma separated integers. Remember : Merge Sort uses a **merge**

function to merge two sorted lists. Print the sorted numbers, also output the number of times the **merge** function is called.

**Sample Input line 1:** 20

**Sample Input line 2:** 20,19,18,17,16,15,14,13,12,11,10,9,8,7,6,5,4,3,2,1

**Output line 1:** 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

**Output line 2:** 19

**Problem 4:** (Quick Sort) Write a (C) program to input **n** comma separated integers and store them in an array, use a **recursive** Quick sort function to sort the integers in increasing order. The first line of input is **n** and the next line contains **n** comma separated integers. Use the last element as the pivot. Print the sorted numbers, also output the pivot index of the last element for the given input in a new line.

**Sample Input line 1:** 20

**Sample Input line 2:** 25,21,3,2,1,5,6,7,8,9,22,11,15,14,13,12,9,5,2,18

**Output line 1:** 1 2 2 3 5 5 6 7 8 9 9 11 12 13 14 15 18 21 22 25

**Output line 2:** 16