10 - Searching & Sorting

Ex. No. : 10.1 **Date:**

Register No.: 230701362 **Name:THARUNRAJ I**

Merge Sort

Write a Python program to sort a list of elements using the merge sort algorithm.

For example:

Input	Result
5 6 5 4 3 8	3 4 5 6 8

CODE:

```
def merge(arr, l, m, r):
    n1 = m - l + 1
    n2 = r - m
    L = [0] * (n1)
    R = [0] * (n2)

    for i in range(0, n1):
        L[i] = arr[l + i]

    for j in range(0, n2):
        R[j] = arr[m + 1 + j]
```

```
    i = 0
    j = 0
    k = l

    while i < n1 and j < n2:
        if L[i] <= R[j]:
            arr[k] = L[i]
            i += 1
        else:
            arr[k] = R[j]
            j += 1
        k += 1
    while i < n1:
        arr[k] = L[i]
        i += 1
        k += 1
    while j < n2:
        arr[k] = R[j]
        j += 1
        k += 1
def mergeSort(arr, l, r):
    if l < r:
        m = l+(r-l)//2
        mergeSort(arr, l, m)
        mergeSort(arr, m+1, r)
        merge(arr, l, m, r)

n=int(input())
```

```
arr=list(map(int,input().split()))
mergeSort(arr, 0, n-1)
for i in range(n):
    print("%d" % arr[i],end=" ")
```

Ex. No. : 10.2 **Date:**

Register No.: 230701362 **Name:THARUNRAJ I**

Bubble Sort

Given an listof integers, sort the array in ascending order using the *Bubble Sort* algorithm above. Once sorted, print the following three lines:

1. List is sorted in numSwaps swaps., where numSwaps is the number of swaps that took place.
2. First Element: firstElement, the *first* element in the sorted list.
3. Last Element: lastElement, the *last* element in the sorted list.

For example, given a worst-case but small array to sort: a=[6,4,1]. It took 3 swaps to sort the array. Output would be

Array is sorted in 3 swaps.
First Element: 1
Last Element: 6

Input Format

The first line contains an integer,n , the size of the list a .
The second line contains n, space-separated integers a[i].

Constraints

- 2<=n<=600
- 1<=a[i]<=$2x10^6$.

Output Format

You must print the following three lines of output:

1. List is sorted in numSwaps swaps., where numSwaps is the number of swaps that took place.
2. First Element: firstElement, the *first* element in the sorted list.
3. Last Element: lastElement, the *last* element in the sorted list.

Sample Input 0

3

1 2 3

Sample Output 0

List is sorted in 0 swaps.

First Element: 1

Last Element: 3

For example:

Input	Result
3 3 2 1	List is sorted in 3 swaps. First Element: 1 Last Element: 3
5 1 9 2 8 4	List is sorted in 4 swaps. First Element: 1 Last Element: 9

CODE:

```
n=int(input())
co=0
l=list(map(int,input().split()))
for j in range(n):
    for i in range(n-1):
        if(l[i]>l[i+1]):
            temp=l[i+1]
            l[i+1]=l[i]
            l[i]=temp
            co+=1
print("List is sorted in %d swaps."%(co))
print("First Element: %d"%(l[0]))
print("Last Element: %d"%(l[n-1]))
```

Ex. No. : 10.3 **Date:**

Register No.: 230701362 **Name:THARUNRAJ I**

Peak Element

Given an list, find peak element in it. A peak element is an element that is greater than its neighbors.

An element a[i] is a peak element if

A[i-1] <= A[i] >=a[i+1] for middle elements. [0<i<n-1]

A[i-1] <= A[i] for last element [i=n-1]

A[i]>=A[i+1] for first element [i=0]

Input Format

The first line contains a single integer n , the length of A .
The second line contains n space-separated integers,A[i].

Output Format

Print peak numbers separated by space.

Sample Input

5

8 9 10 2 6

Sample Output

10 6

For example:

Input	Result
4 12 3 6 8	12 8

CODE:

```
n=int(input())
l=list(map(int,input().split()))
for i in range(n):
    if(i>0 and i<n-1):
        if(l[i]>l[i-1] and l[i]>l[i+1]):
            print(l[i],end=" ")
    else:
        if(i==0 and l[i]>l[i+1]):
            print(l[i],end=" ")
        elif(i==n-1 and l[i]>l[i-1]):
            print(l[i],end=" ")
```

Ex. No. : 10.4 **Date:**

Register No.: 230701362 **Name:THARUNRAJ I**

BUBBLE SORT

Bubble Sort is the simplest sorting algorithm that works by repeatedly swapping the adjacent elements if they are in wrong order. You read an list of numbers. You need to arrange the elements in ascending order and print the result. The sorting should be done using bubble sort.

Input Format: The first line reads the number of elements in the array. The second line reads the array elements one by one.

Output Format: The output should be a sorted list.

For example:

Input	Result
6 3 4 8 7 1 2	1 2 3 4 7 8
5 4 5 2 3 1	1 2 3 4 5

CODE:

```
n=int(input())
l=list(map(int,input().split()))
for j in range(n):
   for i in range(n-1):
     if(l[i]>l[i+1]):
        temp=l[i+1]
```

```
            l[i+1]=l[i]
            l[i]=temp
for i in l:
    print(i,end=" ")
```

Ex. No. : 10.5 **Date:**

Register No.: 230701362 **Name:THARUNRAJ I**

Frequency of Elements

To find the frequency of numbers in a list and display in sorted order.

Constraints:

1<=n, arr[i]<=100

Input:

1 68 79 4 90 68 1 4 5

output:

1 2
4 2
5 1
68 2
79 1
90 1

For example:

Input	Result
4 3 5 3 4 5	3 2 4 2 5 2

CODE:

```
l=list(map(int,input().split()))
s=set(l)
for i in s:
    print("%d %d"%(i,l.count(i)))
```