

# Summer Coding Assignments

# Assignment 1: Arrays

May 16, 2018

This assignment is extremely simple, and is designed to familiarize you with some basic programming elements in C++.

## 1 Problem Statement

You will be given an array of integers. Your task is to find the minimum and the maximum and to sort the array.

You are expected to write three functions:

- `int findMin(int * arr, int N)` : Returns minimum element
- `int findMax(int * arr, int N)` : Returns maximum element
- `void sortArr(int * arr, int N)` : Returns sorted array

It is recommended that you use one of the simpler sorting algorithms, eg, insertion sort, selection sort etc. Save your C++ program as *FirstName\_a1.cpp*

### Input

The input will be read from a file called **input1**. The first line of the input file gives the number of test cases, T.

T test cases follow. Each consists of two lines. The first line has a number N which tells how many integers will there be in the array. The second line has N integers.

## Output

Write your output to a file and name it **output1**.

For each test case, output three lines containing the following:

1. Minimum integer in the array
2. Maximum integer in the array
3. All integers sorted from smallest to largest.

Thus, your output file must contain a total of  $3 \times T$  lines, where  $T$  is the number of test cases.

## Limits

Integers in an array can be repeated.

## Sample

```
input1
-----
2
4
1 4 3 2
6
9 75 4 2 1 30

output1
-----
1
4
1 2 3 4
1
75
1 2 4 9 30 75
```

## 2 Notes (Optional Reading)

C++ is much easier than C. We are going to use the website <http://www.learncpp.com/> and <https://www.tutorialspoint.com/cplusplus/index.htm> for learning C++. You only need to read the following if you are not familiar with C++. Otherwise, you can just go ahead with the assignment.

### 2.1 Opening File

```
#include <fstream>
using namespace std;

//Need to include the above statement in ALL C++ programs

int main() {
    fstream fin;
    fin.open("input1", ios::in); //Open file for reading
    fstream fout;
    fout.open("output1", ios::out); //Open file for writing
    cout<<"Both files opened"<<endl; //Print message to screen
}
```

### 2.2 Memory allocation in C++

Memory allocation in C++ is much easier than doing malloc in C. You can also use malloc in C++ if you like.

```
#include <iostream>
using namespace std;
//Need to include the above statement in ALL C++ programs

int main() {
    int * arr1 = NULL, *arr2 = NULL;
    int N;
    cin>>N; //Take user input
    arr1 = new int[N]; //Now arr has been allocated memory of size N.
    arr2 = (int *)malloc(N*sizeof(int));
    //To free the allocated memory
    delete [] arr1;
}
```

## 2.3 Passing arrays

An example program to show how to fill an array with 1's.

```
#include <iostream>
using namespace std;
//Need to include the above statement in ALL C++ programs

int fillWithOne(int * arr, int N) {
    int i = 0;
    for(i=0;i<N;i++) {
        arr[i] = 1;
    }
}

int main() {
    int * arr1 = NULL, *arr2 = NULL;
    int N = 100, i = 0;
    arr1 = new int[N]; //Now arr has been allocated memory of size N.
    fillWithOne(arr1, N);
    for(i=0;i<N;i++) {
        cout<<arr[i]<<" ";
    }
    cout<<endl;
}
```