

# CS2710 Lab Assignment 8

10th October 2016

Due date:

## Question 1

Implement the operations on min-heaps, listed down in file **heap.h**, in **heap.c**

## Question 2

Given 3 arrays

1. sorted in **ascending order**
2. sorted in **descending order**
3. randomly populated

Sort the arrays in ascending order using **heapsort** and print the sorted arrays to **stdout**, each in a separate line and store the size and times taken by each of them in a file called **running\_times.txt**, created in the directory **CSXXXXXX\_LAB/**. Finally plot **Time Vs Size** graph and analyze the results.

**Input Description:** First line of the input will contain a single integer **t**, the number of test-cases followed by 4\*t lines where the first line of each input will contain **n**, the number of elements in the array and next 3 lines will contain the space-separated array elements where 1. array will be sorted in ascending order 2. array will be sorted in descending order and 3. array will be randomly populated

**Output Description:** For each test-input output the sorted arrays to stdout, each in a separate line and write the size and times taken to sort each of the arrays in the file **running\_times.txt**.

### Example

**Input:**

2

```
5
2 5 7 11 18
18 13 12 9 3
5 2 1 9 17
6
-12 -8 -3 0 8 10
9 6 2 0 -3 -7
29 1 -3 32 2 -40
```

**Output:**

```
2 5 7 11 18
3 9 12 13 18
1 2 5 9 17
-12 -8 -3 0 8 10
-7 -3 0 2 6 9
-40 -3 1 2 29 32
```

and in the running\_times.txt:

```
5 1.231 12.89 7.7651
6 4.0003 17.785 9.4512
```

**Note:** times must be in milliseconds

### Question 3:

Given an array representation of **Min Heap** data structure , convert it to **Max Heap** in linear time with minimum number of computations.

**Input Description:**

first line contains a single integer n, size of the min-heap  
Second line contains space separated min-heap elements

**Example**

**Input:**

```
8
2 4 3 7 5 5 8 10
```

**Output:**

```
10 7 8 4 5 5 3 2
```