**CS 254 - Design and Analysis of Algorithms Lab**, **Assignment-2**

(To be submitted by 21 January 2024)

1. Given two sorted arrays of $A$ and $B$ of $m$ and $n$ elements, respectively,
   (a) Construct a sorted array $C$ by merging $A$ and $B$.
   (b) Construct a sorted array $C$ for $A \cup B$.
   (c) Construct a sorted array $C$ for $A \cap B$.
2. You are given an array $A$ of $n$ elements, where the first $m$ ($\leq n$) elements are sorted and the remaining $(n - m)$ elements are also sorted. However, the array $A$ may not be sorted.
   (a) Write down an in-place merge algorithm to sort $A$.
3. Use the above merging algorithm to sort an unsorted array.
4. Obtain the median element from an unsorted array.
5. Given An unsorted array, find the first and the second minima from the array. Analyze the complexity.
6. Implement a Quick sort algorithm, where the pivot element is almost the median of the array.