Assignment-4

29 January 2024

Solve the following problems efficiently. Analyze space and time complexities of your algorithms.

1. Given an array of integers $A[\ ]$, if $i < j$ and $A[i] > A[j]$ then the pair (i, j) is called the inversion of an array $A[\ ]$. Write a program to find the total counts of inversion in an array $A[\ ]$.

Example:
input: $A[\ ] = \{3, 2, 1\}$
output: 3

2. Given two sorted arrays $nums1$ and $nums2$ of size m and n, respectively; return the median of the two sorted arrays.

Example:
input: $nums1 = [1, 3],\ nums2 = [2]$
output: 2.00000

3. Given an integer array $nums$ and an integer k, return the kth largest element in the array.

(Note that it is the kth largest element in the sorted order, **not** the kth distinct element.)

Example:
input: $nums = [3, 2, 1, 5, 6, 4],\ k = 2$
output: 5