Lab Manual

Course Title : Design and Analysis of Algorithms

Week 2:

I. Given a sorted array of positive integers containing few duplicate elements, design an algorithm and implement it using a program to find whether the given key element is present in the array or not. If present, then also find the number of copies of given key. (Time Complexity = O(log n))

Input format:
The first line contains number of
test cases, T. For each test case,
there will be three input lines. First
line contains n (the size of array).
Second line contains space-separated integers describing array.
Third line contains the key element that need to be searched in the array.

Output format:
The output will have T number of lines.
For each test case T, output will be the key element and its number of copies in the array if the key element is present in the array otherwise print " **Key not present**".

Sample I/O Problem I:

Input:	Output:
2	981 - 2
10	75 - 3
235 235 278 278 763 764 790 853 981 981	
981	
15	
1 2 2 3 3 5 5 5 25 75 75 75 97 97 97	
75	

II. Given a sorted array of positive integers, design an algorithm and implement it using a program to find three indices i, j, k such that arr[i] + arr[j] = arr[k].

Input format:
The first line contains number of
test cases, T. For each test case,
there will be two input lines. First
line contains n (the size of array).
Second line contains space-separated integers describing array.

Output:
The output will have T number of lines.
For each test case T, print the value of i, j and k, if found else print "**No sequence found**".

Sample I/O Problem II:

Input:	Output:
3	No sequence found.
5	2, 7, 8
1 5 84 209 341	1, 6, 9
10	
24 28 48 71 86 89 92 120 194 201	
15	
64 69 82 95 99 107 113 141 171 350 369 400 511 590 666	

III. Given an array of nonnegative integers, design an algorithm and a program to count the number of pairs of integers such that their difference is equal to a given key, K.

Input format:
The first line contains number of test cases, T.
For each test case, there will be three input lines.
First line contains n (the size of array).
Second line contains space-separated integers describing array.
Third line contains the key element.

Output format:
The output will have T number of lines.
For each test case T, output will be the total count i.e. number of times such pair exists.

Sample I/O Problem III:

Input:	Output:
2	2
5	4
1 51 84 21 31	
20	
10	
24 71 16 92 12 28 48 14 20 22	
4	