

Week 2:

1. 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".

2. 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".

3. 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.

Q1.

```
#include<iostream>

#define max 100

using namespace std;

int main()
{
    int a[100];

    int t,i,key,n,flag,c;

    cout<<"enter number of test cases";

    cin>>t;

    for(int p=0;p<t;p++)
    {
        flag=0;

        c=1;

        cout<<"enter the number of elements:";

        cin>>n;

        cout<<"enter the sorted array";

        for(i=0;i<n;i++)

            cin>>a[i];

        cout<<"enter the element to be searched";

        cin>>key;

        int l=0,u=n-1,mid,temp;

        while(l<=u)
```

```

{
    mid=(l+u)/2;
    if(key==a[mid])
    {
        temp=mid;
        flag=1;
        while(a[mid-1]==key)
        {
            mid--;
        }
        c++;}
    while(a[temp+1]==key)
    {
        temp++;
        c++;
    }
    break;
}

else if(key<mid)
    u=mid-1;

else
    l=mid+1;

}

if(flag==0)
    cout<<"not Present";

else

```

```
        cout<<key<<" - "<<c<<endl;
    }
    return 0;    }
```

OUTPUT-

enter number of test cases2

enter the number of elements:10

enter the sorted array235 235 278 278 763 764 790 853 981 981

enter the element to be searched981

981 - 2

enter the number of elements:15

enter the sorted array1 2 2 3 3 5 5 5 25 75 75 75 97 97 97

enter the element to be searched75

75 - 3

Q2.

```
#include<iostream>

#define max 100

using namespace std;

int main()
{
    int a[100];

    int t,i,key,n,j,k;

    cout<<"enter number of test cases";

    cin>>t;

    for(int p=0;p<t;p++)
    {
        cout<<"enter the number of elements:";

        cin>>n;

        cout<<"enter the sorted array";

        for(i=0;i<n;i++)

            cin>>a[i];

        int f=0;

        for(i=0;i<n;i++)
        {
            for(j=i+1;j<n;j++)

                {
```

```
        for(k=j+1;k<n;k++)
        {

            if(a[i]+a[j]==a[k])
            {

                cout<<i+1<<","<<j+1<<","<<k+1<<endl;

                f=1;

                break;

            }

        }

    }

}

if(f==0)

    cout<<"No sequence found"<<endl;

}

return 0;

}
```

OUTPUT-

enter number of test cases3

enter the number of elements:5

enter the sorted array1 5 84 209 341

No sequence found

enter the number of elements:10

enter the sorted array24 28 48 71 86 89 92 120 194 201

2,7,8

enter the number of elements:15

enter the sorted array64 69 82 95 99 107 113 141 171 350 369 400 511 590 666

1,6,9

Q3.

```
#include<iostream>

#include<cstdlib>

using namespace std;

int main()
{
    int a[100];

    int t,i,key,n,c,j;

    cout<<"enter number of test cases";

    cin>>t;

    for(int p=0;p<t;p++)
    {

        c=0;

        cout<<"enter the number of elements:";

        cin>>n;

        cout<<"enter the elements";

        for(i=0;i<n;i++)

            cin>>a[i];

        cout<<"enter the element to be searched";

        cin>>key;

        for(i=0;i<n;i++)

            {
```



```
    for(j=i+1;j<n;j++)
    {

        if(abs(a[i]-a[j])==key)

            c++;

    }

    cout<<c<<endl;

}

return 0;

}
```

OUTPUT-

enter number of test cases2

enter the number of elements:5

enter the elements1 51 84 21 31

enter the element to be searched20

2

enter the number of elements:10

enter the elements24 71 16 92 12 28 48 14 20 22

enter the element to be searched4

4
