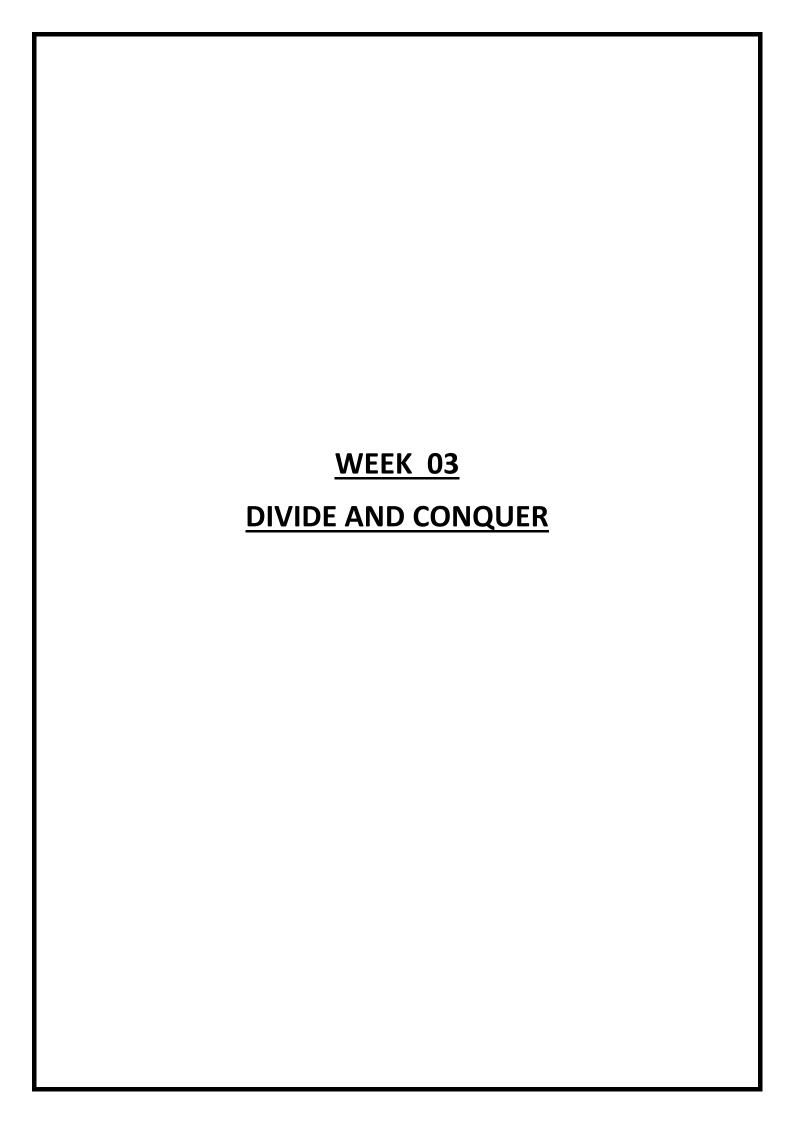
RAJALAKSHMI ENGINEERING COLLEGE RAJALAKSHMI NAGAR, THANDALAM – 602 105



CS23331 DESIGN AND ANALYSIS OF ALGORITHM LAB

Laboratory Observation Note Book

Name : Aswini G
Year / Branch / Section : 2 nd Year/ AIML / A
Register No. : 231501028
Semester : 3 rd Şemester
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1) Problem Statement

Given an array of 1s and 0s this has all 1s first followed by all 0s. Aim is to find the number of 0s. Write a program using Divide and Conquer to Count the number of zeroes in the given array.

Input Format:

First Line Contains Integer m – Size of array

Next m lines Contains m numbers – Elements of an array

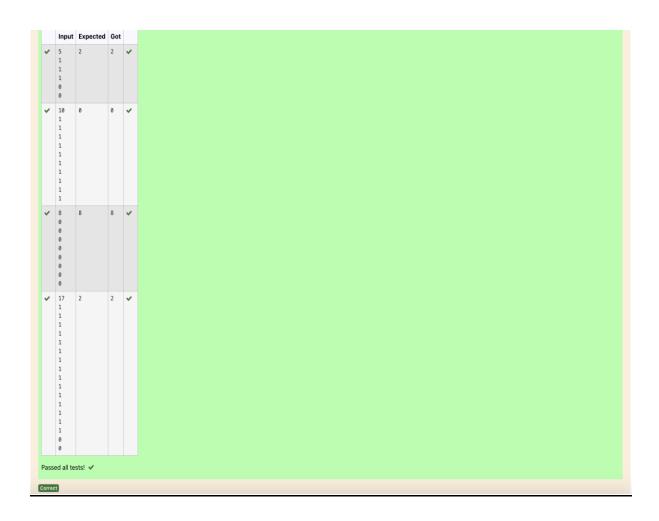
Output Format:

First Line Contains Integer - Number of zeroes present in the given array.

```
#include<stdio.h>
int conquer(int a[],int start,int end){
  int mid=(start+end)/2;
  if(start==end && a[start]==0){
    return 1;
  }
  if(start==end && a[start]!=0){
    return 0;
  }
  return(conquer(a,start,mid)+conquer(a,mid+1,end));
}
int main(){
  int n,i;
  scanf("%d",&n);
  int a[n];
  for(i=0;i<n;i++){
    scanf("%d",&a[i]);
  }
  int start=0,end=n-1;
  printf("%d",conquer(a,start,end));
```

}

OUTPUT:



2) Given an array nums of size n, return the majority element.

The majority element is the element that appears more than [n / 2] times. You may assume that the majority element always exists in the array.

Example 1:

Input: nums = [3,2,3]

Output: 3

Example 2:

Input: nums = [2,2,1,1,1,2,2]

Output: 2

Constraints:

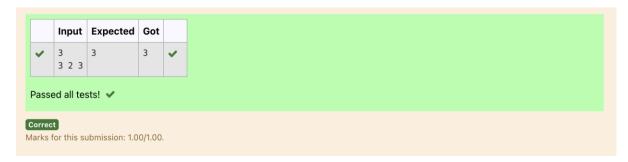
- n == nums.length
- 1 <= n <= 5 * 10⁴
- -2³¹ <= nums[i] <= 2³¹ 1

For example:

Input	Result
3 3 2 3	3
7 2211122	2

```
#include<stdio.h>
int main(){
  int n;
  scanf("%d",&n);
  int a[n];
  for(int i=0;i<n;i++){
    scanf("%d",&a[i]);
}</pre>
```

```
for(int i=0;i<n;i++){
    int count=0;
    for(int j=0;j<n;j++){
        if(a[i]==a[j]){
            count++;
        }
        if(count>n/2){
            printf("%d",a[i]);
            break;
        }
    }
}
```



3) Problem Statement:

Given a sorted array and a value x, the floor of x is the largest element in array smaller than or equal to x. Write divide and conquer algorithm to find floor of x.

Input Format:

First Line Contains Integer n – Size of array

Next n lines Contains n numbers – Elements of an array

Last Line Contains Integer x – Value for x

Output Format:

First Line Contains Integer – Floor value for x

```
#include<stdio.h>
int main(){
  int n,x,flr,i;
  scanf("%d",&n);
  int a[n];
  for(i=0;i<n;i++)
    scanf("%d",&a[i]);
  scanf("%d",&x);
  int mid=n/2;
  if(x<a[mid])
     flr=a[0];
    for(i=0;i<mid;i++)
     {
       if(a[i]>=flr)
         if(a[i] < x)
            flr=a[i];
     }
  }
```

```
else
{
    flr=a[mid];
    for(i=mid;i<n;i++)
    {
        if(a[i]>=flr)
            if(a[i]<x)
            flr=a[i];
        }
    printf("%d",flr);
}</pre>
```

	Expected	Got	
6 1 2 8 10 12 19 5	2	2	*
5 10 22 85 108 129 100	85	85	~
7 3 5 7 9 11 13 15	9	9	*

4) Problem Statement:

Given a sorted array of integers say arr[] and a number x. Write a recursive program using divide and conquer strategy to check if there exist two elements in the array whose sum = x. If there exist such two elements then return the numbers, otherwise print as "No".

Note: Write a Divide and Conquer Solution

Input Format:

First Line Contains Integer n – Size of array

Next n lines Contains n numbers – Elements of an array

Last Line Contains Integer x – Sum Value

Output Format:

First Line Contains Integer – Element1

Second Line Contains Integer – Element2 (Element 1 and Elements 2 together sums to value "x").

```
#include<stdio.h>
int main()
{
  int n,i,j,m,p,q,x;
  scanf("%d",&n);
  int a[n];
  for(i=0;i<n;i++)
    scanf("%d",&a[i]);
  scanf("%d",&x);
  for(i=0;i<n;i++)
    for(j=i+1;j<n;j++){
       if((a[i]+a[j])==x){
         q=a[i]+a[j];
         m=a[i];
         p=a[j];
       }
```

```
}
if(q==x) {
    printf("%d\n",m);
    printf("%d",p);
}
else
    printf("No");
}
```



Passed all tests! 🗸

Correct

Marks for this submission: 1.00/1.00.

5) Write a Program to Implement the Quick Sort Algorithm

Input Format:

The first line contains the no of elements in the list-n The next n lines contain the elements.

Output:

Sorted list of elements

For example:

Result
12 34 67 78 98

```
if(a[i]>a[j])
{
    temp=a[i];
    a[i]=a[j];
    a[j]=temp;
}
}
for(i=0;i<n;i++)
    printf("%d ",a[i]);
}</pre>
```

	Input	Expected	Got	
*	5 67 34 12 98 78	12 34 67 78 98	12 34 67 78 98	~
~	10 1 56 78 90 32 56 11 10 90 114	1 10 11 32 56 56 78 90 90 114	1 10 11 32 56 56 78 90 90 114	~
~	12 9 8 7 6 5 4 3 2 1 10 11 90	1 2 3 4 5 6 7 8 9 10 11 90	1 2 3 4 5 6 7 8 9 10 11 90	~

Passed all tests! 🗸

Correct

Marks for this submission: 1.00/1.00.