RAJALAKSHMI ENGINEERING COLLEGE

1 SABARISH M K 2024-CSE S2

Started on	Wednesday, 17 September 2025, 3:45 PM
State	Finished
Completed on	Wednesday, 17 September 2025, 3:47 PM
Time taken	1 min 42 secs
Marks	1.00/1.00
Grade	**10.00** out of 10.00 (**100**%)

Question 1 | Correct Mark 1.00 out of 1.00

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.

Answer: (penalty regime: 0 %)

```c
#include <stdio.h>

// Function to find the index of the first zero using divide and conquer (binary search)
int findFirstZero(int arr[], int low, int high) {
    if (high < low)
        return -1;  // No zero found

    int mid = low + (high - low) / 2;

    // Check if mid is the first zero
    if ((mid == 0 || arr[mid - 1] == 1) && arr[mid] == 0)
        return mid;
    else if (arr[mid] == 1)
        // Look in the right half
        return findFirstZero(arr, mid + 1, high);
    else
        // Look in the left half
        return findFirstZero(arr, low, mid - 1);
}

int main() {
    int m;
    scanf("%d", &m);

    int arr[m];
    for (int i = 0; i < m; i++) {
        scanf("%d", &arr[i]);
    }

    int firstZeroIndex = findFirstZero(arr, 0, m - 1);

    if (firstZeroIndex == -1)
        printf("0\n");  // No zeros found
    else
        printf("%d\n", m - firstZeroIndex);

    return 0;
}

```

	Input	Expected	Got	
✓	5 1 1 1 0 0	2	2	✓
✓	10 1 1 1 1 1 1 1 1 1 1	0	0	✓
✓	8 0 0 0 0 0 0 0 0	8	8	✓
✓	17 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 0 0	2	2	✓

Passed all tests! ✓

Correct

Marks for this submission: 1.00/1.00.

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SABARISH M K 2024-CSE S2

Started on	Wednesday, 17 September 2025, 3:47 PM
State	Finished
Completed on	Wednesday, 17 September 2025, 3:48 PM
Time taken	52 secs
Marks	1.00/1.00
Grade	**10.00** out of 10.00 (**100**%)

Question 1 | Correct Mark 1.00 out of 1.00

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`
- $1 <= n <= 5 * 10^4$
- $-2^{31} <= nums[i] <= 2^{31} - 1$

For example:

Input	Result
3 3 2 3	3
7 2 2 1 1 1 2 2	2

Answer: (penalty regime: 0 %)

```c
#include <stdio.h>

int majorityElement(int* nums, int numsSize) {
    int count = 0, candidate = 0;
    for (int i = 0; i < numsSize; i++) {
        if (count == 0) candidate = nums[i];
        count += (nums[i] == candidate) ? 1 : -1;
    }
    return candidate;
}

int main() {
    int n;
    scanf("%d", &n);
    int nums[n];
    for (int i = 0; i < n; i++) {
        scanf("%d", &nums[i]);
    }
    printf("%d\n", majorityElement(nums, n));
    return 0;
}
```

	Input	Expected	Got	
✓	3 3 2 3	3	3	✓

Passed all tests! ✓

Correct

Marks for this submission: 1.00/1.00.

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1 SABARISH M K 2024-CSE S2

Started on	Wednesday, 17 September 2025, 3:48 PM
State	Finished
Completed on	Wednesday, 17 September 2025, 3:49 PM
Time taken	30 secs
Marks	1.00/1.00
Grade	**10.00** out of 10.00 (**100**%)

Question 1 | Correct Mark 1.00 out of 1.00

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

Answer: (penalty regime: 0 %)

```
#include <stdio.h>

int findFloor(int arr[], int low, int high, int x) {
    if (low > high) return -1;

    int mid = low + (high - low) / 2;

    if (arr[mid] == x)
        return arr[mid];
    else if (arr[mid] > x)
        return findFloor(arr, low, mid - 1, x);
    else {
        int floorRight = findFloor(arr, mid + 1, high, x);
        if (floorRight != -1)
            return floorRight;
        else
            return arr[mid];
    }
}

int main() {
    int n;
    scanf("%d", &n);
    int arr[n];
    for (int i = 0; i < n; i++)
        scanf("%d", &arr[i]);
    int x;
    scanf("%d", &x);

    int floorVal = findFloor(arr, 0, n - 1, x);
    printf("%d\n", floorVal);
    return 0;
}
```

	Input	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 10	9	9	✓

Passed all tests! ✓

Correct

Marks for this submission: 1.00/1.00.

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SABARISH M K 2024-CSE S2

Started on	Wednesday, 17 September 2025, 3:51 PM
State	Finished
Completed on	Wednesday, 29 October 2025, 3:47 PM
Time taken	41 days 23 hours
Marks	1.00/1.00
Grade	**10.00** out of 10.00 (**100**%)

Question 1 | Correct Mark 1.00 out of 1.00

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”)

Answer: (penalty regime: 0 %)

```c
#include <stdio.h>
#include <stdlib.h>

int findPairRecursive(int arr[], int L, int R, int x, int *element1, int *element2) {
    if (L >= R) {
        return 0;
    }

    int current_sum = arr[L] + arr[R];

    if (current_sum == x) {
        *element1 = arr[L];
        *element2 = arr[R];
        return 1;
    } else if (current_sum < x) {
        // Move left pointer (L) right to increase sum
        return findPairRecursive(arr, L + 1, R, x, element1, element2);
    } else {
        // Move right pointer (R) left to decrease sum
        return findPairRecursive(arr, L, R - 1, x, element1, element2);
    }
}

int main() {
    int n, x;

    // Read the size of the array (n)
    if (scanf("%d", &n) != 1 || n <= 0) {
        return 1;
    }

    int *arr = (int *)malloc(n * sizeof(int));
    if (arr == NULL) {
        return 1;
    }

    // Read n elements of the sorted array
    for (int i = 0; i < n; i++) {
        if (scanf("%d", &arr[i]) != 1) {
            free(arr);
            return 1;
        }
    }

    // Read the target sum value (x)
    if (scanf("%d", &x) != 1) {
        free(arr);
        return 1;
    }

    int element1 = 0, element2 = 0;

```

	Input	Expected	Got	
✓	4 2 4 8 10 14	4 10	4 10	✓
✓	5 2 4 6 8 10 100	No	No	✓

Passed all tests! ✓

Correct

Marks for this submission: 1.00/1.00.

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SABARISH M K 2024-CSE S2

Started on	Wednesday, 17 September 2025, 3:51 PM
State	Finished
Completed on	Wednesday, 17 September 2025, 3:55 PM
Time taken	3 mins 57 secs
Marks	1.00/1.00
Grade	**10.00** out of 10.00 (**100**%)

Question 1 | Correct Mark 1.00 out of 1.00

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:

Input	Result
5 67 34 12 98 78	12 34 67 78 98

Answer:

```c
#include <stdio.h>

// Function to swap two elements
void swap(int *a, int *b) {
    int temp = *a;
    *a = *b;
    *b = temp;
}

// Partition function
int partition(int arr[], int low, int high) {
    int pivot = arr[high];  // Choose last element as pivot
    int i = (low - 1);

    for (int j = low; j < high; j++) {
        if (arr[j] <= pivot) {
            i++;
            swap(&arr[i], &arr[j]);
        }
    }
    swap(&arr[i + 1], &arr[high]);
    return (i + 1);
}

// QuickSort function
void quickSort(int arr[], int low, int high) {
    if (low < high) {
        int pi = partition(arr, low, high);

        quickSort(arr, low, pi - 1);
        quickSort(arr, pi + 1, high);
    }
}

// Main function
int main() {
    int n;
    scanf("%d", &n);

    int arr[n];
    for (int i = 0; i < n; i++) {
        scanf("%d", &arr[i]);
    }

    quickSort(arr, 0, n - 1);

    for (int i = 0; i < n; i++) {
        printf("%d ", arr[i]);
    }

    return 0;
}
```

	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.

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