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ECE-D

Question 1: Balanced Array

Problem Statement:

Given an array of numbers, find the index of the smallest array element (the pivot), for which the sums of all elements to the left and to the right are equal. The array may not be reordered.

Example: arr=[1,2,3,4,6]

- the sum of the first three elements, 1+2+3=6. The value of the last element is 6.
- Using zero based indexing, arr[3]=4 is the pivot between the two subarrays.
- The index of the pivot is 3.

Function Description: Complete the function balancedSum in the editor below.

balancedSum has the following parameter(s): int arr[n]: an array of integers

Returns: int: an integer representing the index of the pivot

Constraints:

- $3 \leq n \leq 105$
- $1 \leq arr[i] \leq 2 \times 104$, where $0 \leq i < n$
- It is guaranteed that a solution always exists.

Input Format for Custom Testing

Input from stdin will be processed as follows and passed to the function. The first line contains an integer n, the size of the array arr. Each of the next n lines contains an integer, arr[i], where $0 \leq i < n$.

Sample Input:

STDIN Function Parameters

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4 → arr[] size n = 4

1 → arr = [1, 2, 3, 3]

2

3

3

Sample Output 0

2

Explanation 0

- The sum of the first two elements, 1+2=3. The value of the last element is 3.
- Using zero based indexing, arr[2]=3 is the pivot between the two subarrays.
- The index of the pivot is 2.

```c
/*
 * Complete the 'balancedSum' function below.
 *
 * The function is expected to return an INTEGER.
 * The function accepts INTEGER_ARRAY arr as parameter.
 */

int balancedSum(int arr_count, int* arr)
{
    int totalsum = 0;
    for (int i =0;i<arr_count;i++){
        totalsum += arr[i];
    }
    int leftsum =0;
    for(int i =0;i<arr_count;i++){
        int rightsum = totalsum - leftsum -arr[i];
        if(leftsum==rightsum){
            return i;
        }
        leftsum +=arr[i];
    }
    return 1;
}

```

	Test	Expected	Got	
✓	int arr[] = {1,2,3,3};	2	2	✓

Question 2: Sum Them All

Calculate the sum of an array of integers.

Example:

numbers = [3, 13, 4, 11, 9]

The sum is 3 + 13 + 4 + 11 + 9 = 40.

Function Description

Complete the function arraySum in the editor below.

arraySum has the following parameter(s):

int numbers[n]: an array of integers

Returns

int: integer sum of the numbers array

Constraints:

- 1 ≤ n ≤ 104
- 1 ≤ numbers[i] ≤ 104

Input Format for Custom Testing

Input from stdin will be processed as follows and passed to the function.

The first line contains an integer n, the size of the array numbers.

Each of the next n lines contains an integer numbers[i] where 0 ≤ i < n.

Sample Input

5 → numbers[] size n = 5

1 → numbers = [1, 2, 3, 4, 5]

2

3

4

5

Sample Output

15

Explanation

1 + 2 + 3 + 4 + 5 = 15.

```c
/*
 * Complete the 'arraySum' function below.
 *
 * The function is expected to return an INTEGER.
 * The function accepts INTEGER_ARRAY numbers as parameter.
 */

int arraySum(int numbers_count, int *numbers)
{
    int sum =0;
    for (int i =0;i<numbers_count;i++){
        sum = sum+numbers[i];
    }
    return sum;
}
```

	Test	Expected	Got	
✓	int arr[] = {1,2,3,4,5};	15	15	✓

Question 3: Minimum Difference Sum

Given an array of n integers, rearrange them so that the sum of the absolute differences of all adjacent elements is minimized. Then, compute the sum of those absolute differences.

Example

n = 5, arr = [1, 3, 3, 2, 4]

If the list is rearranged as arr' = [1, 2, 3, 3, 4], the absolute differences are |1 - 2| = 1, |2 - 3| = 1,|3 - 3| = 0, |3 - 4| = 1. The sum of those differences is 1 + 1 + 0 + 1 = 3.

Function Description

Complete the function minDiff in the editor below.

minDiff has the following parameter:

arr: an integer array

Returns:

int: the sum of the absolute differences of adjacent elements

Constraints

$2 \leq n \leq 105$

$0 \leq arr[i] \leq 109$, where $0 \leq i < n$

Format For Custom Testing

The first line of input contains an integer, n, the size of arr.

Each of the following n lines contains an integer that describes arr[i] (where $0 \leq i < n$) .

Sample Input For Custom Testing

5 → arr[] size n = 5

5 → arr[] = [5, 1, 3, 7, 3]

1

3

7

3

Sample Output 6

Explanation

n = 5, arr = [5, 1, 3, 7, 3]

If arr is rearranged as arr' = [1, 3, 3, 5, 7], the differences are minimized.

The final answer is |1 - 3| + |3 - 3| + |3 - 5| + |5 - 7| = 6.

```c
 * Complete the 'minDiff' function below.
 *
 * The function is expected to return an INTEGER.
 * The function accepts INTEGER_ARRAY arr as parameter.
 */
#include <stdlib.h>
int compare(const void *a, const void *b){
    return (*(int*)a - *(int*)b);
}
int minDiff(int arr_count, int* arr)
{
    qsort(arr, arr_count,sizeof(int), compare);
    int totaldiff=0;
    for(int i =1;i<arr_count;i++){
        totaldiff += abs(arr[i]-arr[i-1]);
    }
    return totaldiff;
}
```

	Test	Expected	Got	
✓	int arr[] = {5, 1, 3, 7, 3}; printf("%d", minDiff(5, arr))	6	6	✓