

Assignment 1 Questions - Arrays | DSA

Q1. Given an array of integers nums and an integer target, return indices of the two numbers such that they add up to target. You may assume that each input would have exactly one solution, and you may not use the same element twice. You can return the answer in any order.

Example: Input: nums = [2,7,11,15], target = 9 Output: [0,1]

Explanation: Because nums[0] + nums[1] == 9, we return [0, 1]

```
#include<bits/stdc++.h>
using namespace std;
vector<int> twoSum(vector<int>& nums, int target) {
    unordered_map<int,int>mp;
    for(int i=0;i<nums.size();i++)
    {
        int val = target-nums[i];
        if(mp.find(val)!=mp.end())
        {
            return {i,mp[val]};
        }
        mp.insert({nums[i],i});
    }
    return {};
}
int main()
{
    int n;
    cout<<"Enter the array size\n";
    cin>>n;
    cout<<"Enter array elements :\n";
    vector<int>arr(n);
    for(int i=0;i<n;i++)
    {
        cin>>arr[i];
    }
    int target;
    cout<<"Enter the target sum: \n";
    cin>>target;
    vector<int> ans = twoSum(arr,target);
    cout<<"Output is : \n"
    for(auto i:ans)
    cout<<i<<" ";
    cout<<endl;
}
```

Q2. Given an integer array `nums` and an integer `val`, remove all occurrences of `val` in `nums` in-place. The order of the elements may be changed. Then return the number of elements in `nums` which are not equal to `val`. Consider the number of elements in `nums` which are not equal to `val` be `k`, to get accepted, you need to do the following things:

- Change the array `nums` such that the first `k` elements of `nums` contain the elements which are not equal to `val`. The remaining elements of `nums` are not important as well as the size of `nums`.
- Return `k`.

Example : Input: `nums = [3,2,2,3]`, `val = 3` Output: 2, `nums = [2,2,*,*]`

Explanation: Your function should return `k = 2`, with the first two elements of `nums` being 2. It does not matter what you leave beyond the returned `k` (hence they are underscores)

```
#include<bits/stdc++.h>
```

```
using namespace std;
```

```
int removeElement(vector<int>& nums, int val) {
```

```
    int j=0;
```

```
    for(int i=0;i<nums.size();i++)
```

```
    {
```

```
        if(nums[i]!=val)
```

```
        {
```

```
            nums[j]=nums[i];
```

```
            j++;
```

```
        }
```

```
    }
```

```
    return j;
```

```
}
```

```
int main()
```

```
{
```

```
    int n;
```

```

cout<<"Enter the array size\n";

cin>>n;

cout<<"Enter array elements :\n";

vector<int>arr(n);

for(int i=0;i<n;i++)
{
    cin>>arr[i];
}

int val;

cout<<"Enter the value whose occurrence to be removed: \n";

cin>>val;

int k = removeElement(arr, val);

sort(arr.begin(),arr.begin()+k); // Sort the first k elements of nums

cout<<"Output is : \n";

for(int i=0;i<n;i++)
{
    if(i<k)

        cout<<arr[i]<<" ";

    else

        cout<<"_ "<<" ";

}

cout<<endl;
}

```

Q3. Given a sorted array of distinct integers and a target value, return the index if the target is found. If not, return the index where it would be if it were inserted in order.

You must write an algorithm with $O(\log n)$ runtime complexity.

Example 1: Input: nums = [1,3,5,6], target = 5

Output: 2

Sol->

```
// since array is sorted then using binary search we can find the index

#include<bits/stdc++.h>

using namespace std;

int searchInsert(vector<int>& nums, int target) {

    int i = lower_bound(nums.begin(),nums.end(),target)-nums.begin();

    return i;

}

int main()

{

    int n;

    cout<<"Enter the array size\n";

    cin>>n;

    cout<<"Enter array elements :\n";

    vector<int>arr(n);

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

    {

        cin>>arr[i];

    }

    int val;
```

```

    cout<<"Enter the value to be searched: \n";

    cin>>val;

    int k = searchInsert(arr, val);

    cout<<"Output is : \n";

    cout<<k<<endl;

}

```

Q4. You are given a large integer represented as an integer array `digits`, where each `digits[i]` is the *i*th digit of the integer. The digits are ordered from most significant to least significant in left-to-right order. The large integer does not contain any leading 0's.

Increment the large integer by one and return the resulting array of digits.

Example 1: Input: `digits = [1,2,3]` Output: `[1,2,4]`

Explanation: The array represents the integer 123.

Incrementing by one gives $123 + 1 = 124$. Thus, the result should be `[1,2,4]`.

sol->

```

#include<bits/stdc++.h>

using namespace std;

vector<int> plusOne(vector<int>& digits) {

    int i=digits.size()-1;

    while(i>=0)

    {

```

```

        if(digits[i]==9 && i==0)
        {
            digits[0]=1;
            digits.push_back(0);
            return digits;
        }
        else if(digits[i]==9){
            digits[i]=0;
            i--;
        }
        else if(digits[i]!=9){
            digits[i]+=1;
            return digits;
        }
    }

    return digits;
}

int main()
{
    int n;

    cout<<"Enter the digit size\n";

    cin>>n;

    cout<<"Enter digit elements :\n";

    vector<int>arr(n);

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

```

```

{
    cin>>arr[i];
}

int val;

vector<int>ans = plusOne(arr);

cout<<"Output is : \n";

for(int i=0;i<ans.size();i++)
{
    cout<<ans[i]<<" ";
}
}

```

Q5. You are given two integer arrays nums1 and nums2, sorted in non-decreasing order, and two integers m and n, representing the number of elements in nums1 and nums2 respectively.

Merge nums1 and nums2 into a single array sorted in non-decreasing order.

The final sorted array should not be returned by the function, but instead be stored inside the array nums1. To accommodate this, nums1 has a length of m + n, where the first m elements denote the elements that should be merged, and the last n elements are set to 0 and should be ignored. nums2 has a length of n.

Example 1: Input: nums1 = [1,2,3,0,0,0], m = 3, nums2 = [2,5,6], n = 3 Output: [1,2,2,3,5,6]

Explanation: The arrays we are merging are [1,2,3] and [2,5,6]. The result of the merge is [1,2,2,3,5,6] with the underlined elements coming from nums1.

sol->

```
#include<bits/stdc++.h>

using namespace std;

void merge(vector<int>& nums1, int m, vector<int>& nums2, int n) {

    int i=m-1,j=n-1,k=m+n-1;

    while(i>=0 && j>=0)

    {

        if(nums1[i]>nums2[j])

        {

            nums1[k--]=nums1[i];

            i--;

        }

        else

        {

            nums1[k--]=nums2[j];

            j--;

        }

    }

    while(i>=0)

        nums1[k--]=nums1[i--];

    while(j>=0)

        nums1[k--]=nums2[j--];

}

int main()

{
```



```
int m,n;

cout<<"Enter the array-1 size\n";

cin>>m;

cout<<"Enter array-2 elements :\n";

vector<int>arr1(m+n+1);

for(int i=0;i<m;i++)

    cin>>arr1[i];

cout<<"Enter the array-2 size\n";

cin>>n;

cout<<"Enter array-2 elements :\n";

vector<int>arr2(n+m+1);

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

{

    cin>>arr2[i];

}


merge(arr1,m,arr2,n);

cout<<"Output is : \n";

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

{

    cout<<arr1[i]<<" ";

}

return 0;

}
```

Q6. Given an integer array `nums`, return `true` if any value appears at least twice in the array, and return `false` if every element is distinct.

Example 1: Input: `nums = [1,2,3,1]`

Output: `true`

sol->

```
#include<bits/stdc++.h>

using namespace std;

bool containsDuplicate(vector<int>& nums) {

    unordered_map<int,int>mp;

    for(int i=0;i<nums.size();i++)

    {

        mp[nums[i]]++;

    }

    int f=0;

    for(auto i:mp)

    {

        if(i.second>=2)

            return true;

    }

    return false;

}

int main()

{

    int n;

    cout<<"Enter the array size\n";
```

```

cin>>n;

cout<<"Enter array elements :\n";

vector<int>arr(n);

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

{

    cin>>arr[i];

}


bool ans = containsDuplicate(arr);

cout<<"Output is : \n";

if(ans)

cout<<"true";

else

cout<<"false";

return 0;

}

```

Q7. Given an integer array nums, move all 0's to the end of it while maintaining the relative order of the nonzero elements.

Note that you must do this in-place without making a copy of the array.

Example 1: Input: nums = [0,1,0,3,12] Output: [1,3,12,0,0]

sol->

```
#include<bits/stdc++.h>

using namespace std;

void moveZeroes(vector<int>& nums) {

    int j=0;

    for(int i=0;i<nums.size();i++)

    {

        if(nums[i]!=0){

            nums[j]=nums[i];

            j++;

        }

    }

    for(int k=j;k<nums.size();k++){

        nums[k]=0;

    }

}

int main()

{

    int n;

    cout<<"Enter the array size\n";

    cin>>n;

    cout<<"Enter array elements : \n";

    vector<int>arr(n);

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

    {
```

```

        cin>>arr[i];
    }

    moveZeroes(arr);

    cout<<"Output is : \n";

    for(auto i:arr)

        cout<<i<<" ";

    return 0;
}

```

Q8. You have a set of integers s , which originally contains all the numbers from 1 to n . Unfortunately, due to some error, one of the numbers in s got duplicated to another number in the set, which results in repetition of one number and loss of another number.

You are given an integer array `nums` representing the data status of this set after the error.

Find the number that occurs twice and the number that is missing and return them in the form of an array.

Example 1: Input: `nums = [1,2,2,4]` Output: `[2,3]`

sol->

```
#include<bits/stdc++.h>

using namespace std;

vector<int> findErrorNums(vector<int>& nums) {

    int n = nums.size();

    vector<int> arr(n + 1, 0);

    vector<int> vec;

    for (auto i: nums)

    {

        arr[i]++;

    }

    for (int i = 1; i < n + 1; i++)

    {

        if (arr[i] > 1)

            vec.push_back(i);

    }

    for (int i = 1; i < n + 1; i++)

    {

        if (arr[i] == 0)

            vec.push_back(i);

    }

    return vec;

}

int main()
```

```
{  
  
    int n;  
  
    cout<<"Enter the array size\n";  
  
    cin>>n;  
  
    cout<<"Enter array elements :\n";  
  
    vector<int>arr(n);  
  
    for(int i=0;i<n;i++)  
    {  
        cin>>arr[i];  
    }  
  
  
    vector<int>ans = findErrorNums(arr);  
  
    cout<<"Output is : \n";  
  
    for(auto i:ans)  
        cout<<i<<" ";  
  
    return 0;  
}
```

