Question 1

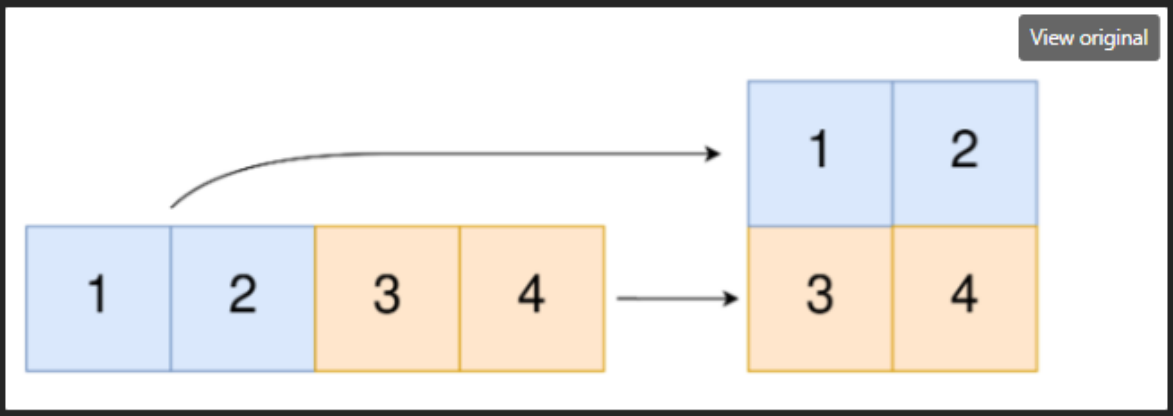
Convert 1D Array Into 2D Array

You are given a **0-indexed** 1-dimensional (1D) integer array original, and two integers, m and n. You are tasked with creating a 2-dimensional (2D) array with m rows and n columns using **all** the elements from original.

The elements from indices 0 to n - 1 (**inclusive**) of original should form the first row of the constructed 2D array, the elements from indices n to 2 * n - 1 (**inclusive**) should form the second row of the constructed 2D array, and so on.

Return *an* m x n *2D array constructed according to the above procedure, or an empty 2D array if it is impossible.*

Example 1:



Input: original = [1,2,3,4], m = 2, n = 2

Output: [[1,2],[3,4]]

Explanation: The constructed 2D array should contain 2 rows and 2 columns.

The first group of n=2 elements in original, [1,2], becomes the first row in the constructed 2D array.

The second group of n=2 elements in original, [3,4], becomes the second row in the constructed 2D array.

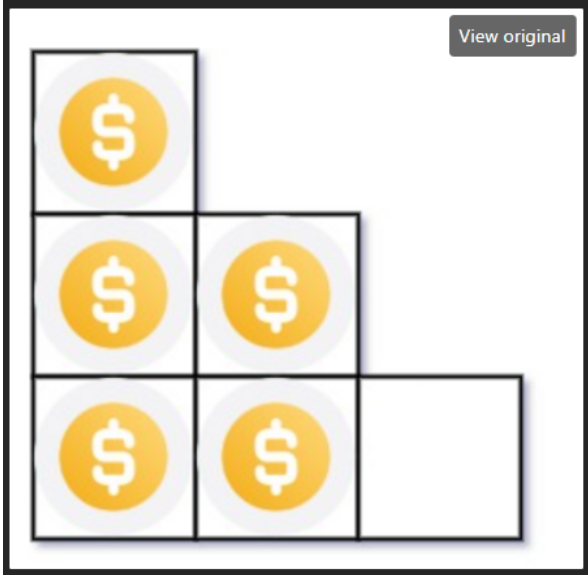
```cpp
class Solution {
public:
    vector<vector<int>> construct2DArray(vector<int>& original, int m,
int n) {
        vector<vector<int>>res(m,vector<int>(n,0));
        if(m*n!=original.size())
        return{};
        for(int i=0;i<original.size();i++){
            res[i/n][i%n]=original[i];
        }
        return res;
    }
};
```

Question 2

You have n coins and you want to build a staircase with these coins. The staircase consists of k rows where the ith row has exactly i coins. The last row of the staircase **may be** incomplete.

Given the integer n, return *the number of **complete rows** of the staircase you will build.*

Example 1:



Input: n = 5

Output: 2

Explanation: Because the 3rd row is incomplete, we return 2.

```cpp
class Solution {
public:
    int arrangeCoins(int n)
    {
        return (-1+sqrt(1.0+4.0*2.0*n))/2;
    }
};
```

Question 3

Given an integer array nums sorted in **non-decreasing** order, return *an array of **the squares of each number** sorted in non-decreasing order.*

Example 1:

Input: nums = [-4,-1,0,3,10]

Output: [0,1,9,16,100]

Explanation: After squaring, the array becomes [16,1,0,9,100].

After sorting, it becomes [0,1,9,16,100].

```cpp
class Solution {
public:
    vector<int> sortedSquares(vector<int>& nums) {
        int n=nums.size();

        for(int i=0;i<n;i++){
            nums[i]=nums[i]*nums[i];
        }
        sort(nums.begin(),nums.end());
        return nums;

    }
};
```

Question 4

Given two **0-indexed** integer arrays nums1 and nums2, return *a list* answer *of size* 2 *where:*

- answer[0] *is a list of all* ***distinct*** *integers in* nums1 *which are* ***not*** *present in* nums2.
- answer[1] *is a list of all* ***distinct*** *integers in* nums2 *which are* ***not*** *present in* nums1.

Note that the integers in the lists may be returned in **any** order.

Example 1:

Input: nums1 = [1,2,3], nums2 = [2,4,6]

Output: [[1,3],[4,6]]

Explanation:

For nums1, nums1[1] = 2 is present at index 0 of nums2, whereas nums1[0] = 1 and nums1[2] = 3 are not present in nums2. Therefore, answer[0] = [1,3].

For nums2, nums2[0] = 2 is present at index 1 of nums1, whereas nums2[1] = 4 and nums2[2] = 6 are not present in nums2. Therefore, answer[1] = [4,6].

```cpp
class Solution {
public:
    vector<vector<int>> findDifference(vector<int>& nums1, vector<int>&
nums2) {
        unordered_set<int> set1(nums1.begin(), nums1.end());
        unordered_set<int> set2(nums2.begin(), nums2.end());

        vector<int> distinct_nums1, distinct_nums2;
        for (int num : set1) {
            if (set2.count(num) == 0) {
                distinct_nums1.push_back(num);
            }
        }

        for (int num : set2) {
            if (set1.count(num) == 0) {
                distinct_nums2.push_back(num);
            }
        }

        return {distinct_nums1, distinct_nums2};
    }
};
```

Question 5

Given two integer arrays arr1 and arr2, and the integer d, *return the distance value between the two arrays.*

The distance value is defined as the number of elements arr1[i] such that there is not any element arr2[j] where |arr1[i]-arr2[j]| <= d.

Example 1:

Input: arr1 = [4,5,8], arr2 = [10,9,1,8], d = 2

Output: 2

Explanation:

For arr1[0]=4 we have:

|4-10|=6 > d=2

|4-9|=5 > d=2

|4-1|=3 > d=2

|4-8|=4 > d=2

For arr1[1]=5 we have:

|5-10|=5 > d=2

|5-9|=4 > d=2

|5-1|=4 > d=2

|5-8|=3 > d=2

For arr1[2]=8 we have:

|8-10|=2 <= d=2

|8-9|=1 <= d=2

|8-1|=7 > d=2

|8-8|=0 <= d=2

```cpp
class Solution {
public:
    int findTheDistanceValue(vector<int>& arr1, vector<int>& arr2, int d)
{
        int cnt=0;
        for(auto it: arr1){
            int flag=0;
            for(auto it1:arr2){
                if(abs(it-it1) >d){
                    flag=1;
                }
                else{
                    flag=0;
                    break;
                }
            }
            if(flag==1){
                cnt++;
            }

        }
        return cnt;
    }
};
```

Question 6

Given an integer array nums of length n where all the integers of nums are in the range [1, n] and each integer appears **once** or **twice**, return *an array of all the integers that appears **twice***.

You must write an algorithm that runs in O(n) time and uses only constant extra space.

Example 1:

Input: nums = [4,3,2,7,8,2,3,1]

Output:

[2,3]

```cpp
class Solution {
public:
    vector<int> findDuplicates(vector<int>& nums) {
        unordered_map<int,int>s;
        vector<int>a;
        for(auto v:nums)
        s[v]++;
        for(auto m:s){
            if(m.second==2)
            a.push_back(m.first);
        }
        return a;
    }
};
```

Question 7

Suppose an array of length n sorted in ascending order is **rotated** between 1 and n times. For example, the array nums = [0,1,2,4,5,6,7] might become:

- [4,5,6,7,0,1,2] if it was rotated 4 times.
- [0,1,2,4,5,6,7] if it was rotated 7 times.

Notice that **rotating** an array [a[0], a[1], a[2], ..., a[n-1]] 1 time results in the array [a[n-1], a[0], a[1], a[2], ..., a[n-2]].

Given the sorted rotated array nums of **unique** elements, return *the minimum element of this array*.

You must write an algorithm that runs in O(log n) time.

Example 1:

Input: nums = [3,4,5,1,2]

Output: 1

Explanation:

The original array was [1,2,3,4,5] rotated 3 times.

```cpp
class Solution {
public:
    int findMin(vector<int>& nums) {
        int low = 0;
        int high = nums.size() - 1;
        int res = nums[0];

        while (low <= high) {
            if (nums[low] < nums[high]) {
                res = min(res, nums[low]);
                break;
            }

            int mid = (low + high) / 2;
            res = min(res, nums[mid]);

            if (nums[mid] >= nums[low]) {
                low = mid + 1;
            } else {
                high = mid - 1;
            }
        }

        return res;
    }
};
```

Question 8

An integer array original is transformed into a **doubled** array changed by appending **twice the value** of every element in original, and then randomly **shuffling** the resulting array.

Given an array changed, return original *if* changed *is a* ***doubled*** *array. If* changed *is not a* ***doubled*** *array, return an empty array. The elements in* original *may be returned in* ***any*** *order.*

Example 1:

Input: changed = [1,3,4,2,6,8]

Output: [1,3,4]

Explanation: One possible original array could be [1,3,4]:

- Twice the value of 1 is 1 * 2 = 2.
- Twice the value of 3 is 3 * 2 = 6.
- Twice the value of 4 is 4 * 2 = 8.

Other original arrays could be [4,3,1] or [3,1,4].

```cpp
class Solution {
public:
    vector<int> findOriginalArray(vector<int>& c) {
        vector<int>ans;
        vector<int>w;
        if(c.size()%2==1)return w;

        sort(c.begin(),c.end());
        unordered_map<int,int>map;
        for(auto i : c) map[i]++;

        for(auto i : c) {
            int cur = i;
            if(map[cur]){
                if(map[cur*2]==0) return w;
                ans.push_back(cur);
                map[cur]--;
                map[cur*2]--;
            }
        }
        return ans;
    }
};
```