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*.

Soln:

```
def convert_to_2d_array(original, m, n):
    if len(original) != m * n:
        return []

    result = [[0] * n for _ in range(m)]

    for i in range(len(original)):
        row = i // n
        col = i % n
        result[row][col] = original[i]

    return result
```

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*.

Soln:

```
import math

def find_complete_rows(n):
    k = math.floor((-1 + math.sqrt(1 + 8 * n)) / 2)
    return k
```

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].

Soln:

```
def sorted_squares(nums):
    result = [0] * len(nums)
    left = 0
    right = len(nums) - 1

    for i in range(len(nums) - 1, -1, -1):
        if abs(nums[left]) >= abs(nums[right]):
            result[i] = nums[left] ** 2
            left += 1
        else:
            result[i] = nums[right] ** 2
            right -= 1

    return result
```

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].

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Soln:

```
def find_disjoint_nums(nums1, nums2):
    set1 = set(nums1)
    set2 = set(nums2)
    answer1 = [num for num in set1 if num not in set2]
    answer2 = [num for num in set2 if num not in set1]
    return [answer1, answer2]
```

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

Soln:

```
def find_distance_value(arr1, arr2, d):
    distance = 0

    for num1 in arr1:
        for num2 in arr2:
            if abs(num1 - num2) <= d:
                break
        else:
            distance += 1

    return distance
```

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]

Soln:

```
def find_duplicates(nums):
    duplicates = []

    for num in nums:
        index = abs(num) - 1
        if nums[index] < 0:
            duplicates.append(abs(num))
        else:
            nums[index] = -nums[index]

    return duplicates
```

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.

Soln:

```
def find_minimum(nums):
    left = 0
    right = len(nums) - 1

    if nums[left] < nums[right]:
        return nums[left]

    while left < right:
        mid = left + (right - left) // 2

        if nums[mid] > nums[right]:
            left = mid + 1
```

```
    else:
        right = mid

return nums[left]
```

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].

Soln:

```
def find_original_array(changed):
    count = {}

    for num in changed:
        if num not in count:
```

```
        count[num] = 1
    else:
        count[num] += 1

for key, value in count.items():
    if key * 2 not in count or count[key * 2] != 2 * value:
        return []

original = []
for key, value in count.items():
    original.extend([key] * value)

return original
```