Assignment Questions 5

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*.

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.

Ans

```
class Solution:
    def construct2DArray(self, original: List[int], m: int, n: int) -> List[List[int]]:
        ans = []
        if len(original) == m*n:
            for i in range(0, len(original), n):
                ans.append(original[i:i+n])
        return ans
```

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.

Ans

```
class Solution:

    def arrangeCoins(self, n: int) -> int:
        coin_counter = 0
        rows = 0

        if n == 1:
            return 1

        while coin_counter+(rows+1) <= n:
            rows += 1
            coin_counter = coin_counter + rows


        return rows
```

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].

Ans

```
class Solution:
    def sortedSquares(self, nums: List[int]) -> List[int]:
        l, r = 0, len(nums)-1
        res = []

        while l <= r:
```

```
        if abs(nums[l]) >= abs(nums[r]):
            res.append(nums[l] ** 2)
            l += 1
        else:
            res.append(nums[r] ** 2)
            r -= 1
    return reversed(res)
```

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].

Ans -

```
class Solution:
    def findDifference(self, nums1: List[int], nums2: List[int]) -> List[List[int]]:

        # define set to store elements
        s1 = set(nums1)
        s2 = set(nums2)

        # define output
        out = [[],[]]

        # adding the elements to output if not contains in the set
        for i in s1:
            if i not in s2:
                out[0].append(i)
        for i in s2:
```

```
        if i not in s1:
            out[1].append(i)


    return out
```

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

ANS

```
class Solution:
    def findTheDistanceValue(self, arr1: List[int], arr2: List[int], d: int) -> int:
        arr2=sorted(arr2)
        res=0
        for num in arr1:
            idx = bisect.bisect_left(arr2, num)
            lower_within_limits = abs(arr2[min(len(arr2)-1, idx)]-num)>d
            higher_within_limits = abs(arr2[max(0, idx-1)]-num)>d
            if lower_within_limits and higher_within_limits:
                res+=1
        return res
```

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]

Ans

```
class Solution:
    def findDuplicates(self, nums: List[int]) -> List[int]:
        ans = []
        for i in range(len(nums)):
            if nums[abs(nums[i])-1]>0:
                nums[abs(nums[i])-1] = -nums[abs(nums[i])-1]
            else:
                ans.append(abs(nums[i]))
        return ans
```

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.

Ans -

class Solution:

```
    def findMin(self, nums: List[int]) -> int:
        low=0
        high=len(nums)-1
        while low<high:
            mid=(low+high)//2
            if nums[mid]>nums[high]:
                low=mid+1
            else:
                high=mid
        return nums[low]
```

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].

Ans –

```
class Solution:
    def findOriginalArray(self, changed: List[int]) -> List[int]:
        if len(changed) % 2 == 1:
            return []
        data = Counter(changed)
        result = []
        for k in sorted(data):
            if data[k] < 0:
                return []
            value = k * 2
            while data[k] > 0:
                if data[value] == 0:
                    return []
                result.append(k)
                data[k] -= 1
                data[value] -= 1
        return result
```