Array

Q1. Count of elements

Problem Description:

- Given an array A of N integers.
- Count the number of elements that have at least 1 element greater than itself.

Example Input

Input 1:

A = [3, 1, 2]

Output:
2

Explanation:

- The elements that have at least 1 element greater than itself are 1 and 2

Input 2:

A = [5, 5, 3]

Output:
1

Explanation:

- The element that has at least 1 element greater than itself is 3.

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Q2. Good Pair

Problem Description :

- Given an array A and an integer B.
- A pair(i, j) in the array is a good pair if i != j and (A[i] + A[j] == B).
- Check if any good pair exist or not.
- Return 1 if good pair exist otherwise return 0.

Example Input

Input 1:
A = [1,2,3,4]
B = 7

Output 1:
1

Input 2:
A = [1,2,4]
B = 4

Output 2:
0

Input 3:
A = [1,2,2]
B = 4

Output 3:
1

Example Explanation :

Explanation 1:
(i,j) = (3,4)

Explanation 2:
No pair has a sum equal to 4.

Explanation 3:
(i,j) = (2,3)

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Q3. Reverse in a range

Problem Description :

- Given an array A of N integers.
- Also given are two integers B and C.
- Reverse the array A in the given range [B, C]
- Return the array A after reversing in the given range.

Problem Constraints :

1 <= N <= 105
1 <= A[i] <= 109
0 <= B <= C <= N - 1

Example Input

Input 1:
A = [1, 2, 3, 4]
B = 2
C = 3

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

Input 2:
A = [2, 5, 6]
B = 0
C = 2

Output 2:
[6, 5, 2]

Example Explanation :

Explanation 1:
We reverse the subarray [3, 4].

Explanation 2:
We reverse the entire array [2, 5, 6].

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Q4. Reverse the array

Problem Description :

- You are given a constant array A.
- You are required to return another array which is the reversed form of the input array.
- Return an integer array.

Problem Constraints :
1 <= A.size() <= 10000
1 <= A[i] <= 10000

Example Input :

Input 1:
A = [1,2,3,2,1]

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

Input 2:
A = [1,1,10]

Output 2:
[10,1,1]

Example Explanation :

Explanation 1:
- Reversed form of input array is same as original array

Explanation 2:
- Reverse of [1,1,10] is [10,1,1]

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Q5. Array Rotation

Problem Description :

- Given an integer array A of size N and an integer B, you have to return the same array after rotating it B times towards the right.
- Return the array A after rotating it B times to the right

Problem Constraints :
1 <= N <= 105
1 <= A[i] <=109
1 <= B <= 109

Example Input :

Input 1:
A = [1, 2, 3, 4]
B = 2

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

Input 2:

A = [2, 5, 6]
B = 1

Output 2:
[6, 2, 5]

Example Explanation :

Explanation 1:

Rotate towards the right 2 times
[1, 2, 3, 4] => [4, 1, 2, 3] => [3, 4, 1, 2]

Explanation 2:

Rotate towards the right 1 time
[2, 5, 6] => [6, 2, 5]

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Q6.

Given an Integer array of size of N.
Count the number of elements having at least 1 element greater than itself.

Input:
int arr[] = {2,5,1,4,8,0,8,1,3,8};

Output:
7

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Q7. Column Sum

Problem Description :

- You are given a 2D integer matrix A, and return a 1D integer array containing column-wise sums of the original matrix.
- Return an array containing column-wise sums of the original matrix.

Input :
[1,2,3,4]
[5,6,7,8]
[9,2,3,4]

Output :
{15,10,13,16}

Example Explanation

Column 1 = 1+5+9 = 15
Column 2 = 2+6+2 = 10
Column 3 = 3+7+3 = 13
Column 4 = 4+8+4 = 16

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Q8: Row sum

Problem Description :

- You are given a 2D integer matrix A, and return a 1D integer array containing row-wise sums of the original matrix.
- Return an array containing row-wise sums of the original matrix.

Input 1:
[1,2,3,4]
[5,6,7,8]
[9,2,3,4]

Output 1:
[10,26,18]

Explanation :

Row 1 = 1+2+3+4 = 10
Row 2 = 5+6+7+8 = 26
Row 3 = 9+2+3+4 = 18

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Q9: Main Diagonal sum

Problem Description :

- You are given a N X N integer matrix.
- You have to find the sum of all the main diagonal elements of A.
- The main diagonal of a matrix A is a collection of elements A[i, j] such that i = j.
- Return an integer denoting the sum of main diagonal elements.

Input 1:
3 3 1 -2 -3 -4 5 -6 -7 -8 9

Output 1:
15

Input 2:
2 2 3 2 2 3

Output 2:
6

Example Explanation :

Explanation 1:
A[1][1] + A[2][2] + A[3][3] = 1 + 5 + 9 = 15

Explanation 2:
A[1][1] + A[2][2] = 3 + 3 = 6

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Q10. Minor Diagonal Sum

Problem Description :

- You are given a N X N integer matrix.
- You have to find the sum of all the minor diagonal elements of A.
- Minor diagonal of a M X M matrix A is a collection of elements A[i, j] such that i + j = M + 1 (where i, j are 1-based).
- Return an integer denoting the sum of minor diagonal elements.

Input 1:
A = [[1, -2, -3],
[-4, 5, -6],
[-7, -8, 9]]

Output 1:
-5

Input 2:
A = [[3, 2],
[2, 3]]

Output 2:
4

Example Explanation :

Explanation 1:
A[1][3] + A[2][2] + A[3][1] = (-3) + 5 + (-7) = -5

Explanation 2:
A[1][2] + A[2][1] = 2 + 2 = 4

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Q11. Anti-Diagonal

Problem Description :

- Give an N * N square matrix A, and return an array of its anti-diagonals.
- Return a 2D integer array of size (2 * N-1) * N, representing the anti-diagonals of input array A.
- The vacant spaces in the grid should be assigned to 0.

Example Input

Input 1:
1 2 3
4 5 6
7 8 9

Output 1:
1 0 0
2 4 0
3 5 7
6 8 0
9 0 0

Input 2:
1 2
3 4

Output 2:
1 0
2 3
4 0

Example Explanation :

For input 1:
- The first anti-diagonal of the matrix is [1], the rest spaces should be filled with 0 making the row [1, 0, 0].
- The second anti-diagonal of the matrix is [2, 4], the rest spaces should be filled with 0 making the row [2, 4, 0].
- The third anti-diagonal of the matrix is [3, 5, 7], the rest spaces

should be filled with 0 making the row [3, 5, 7].
- The fourth anti-diagonal of the matrix is [6, 8], the rest spaces should be filled with 0 making the row [6, 8, 0].
- The fifth anti-diagonal of the matrix is [9], the rest spaces should be filled with 0 making the row [9, 0, 0].

For input 2:
- The first anti-diagonal of the matrix is [1], the rest spaces should be filled with 0 making the row [1, 0, 0].
- The second anti-diagonal of the matrix is [2, 4], the rest spaces should be filled with 0 making the row [2, 4, 0].
- The third anti-diagonal of the matrix is [3, 0, 0], the rest spaces should be filled with 0 making the row [3, 0, 0].

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Q12. Matrix Transpose

Problem Description :

- You are given a matrix A, and you have to return another matrix which is the transpose of A.
- You have to return the Transpose of this 2D matrix.

NOTE: Transpose of a matrix A is defined as - AT[i][j] = A[j][i] ; Where 1 ≤ i ≤ col and 1 ≤ j ≤ row. The transpose of a matrix switches the element at (i, j)th index to (j, i)th index, and the element at (j, i)th index to (i, j)th index.

Input :
A = [[1, 2, 3],[4, 5, 6],[7, 8, 9]]

Output :
[[1, 4, 7], [2, 5, 8], [3, 6, 9]]

Explanation :
- after converting rows to columns and columns to rows of [[1, 2, 3],[4, 5, 6],[7, 8, 9]] we will get [[1, 4, 7], [2, 5, 8], [3, 6, 9]].

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Q13. Rotate matrix

Problem Description :

- You are given a n x n 2D matrix A representing an image.
- Rotate the image by 90 degrees (clockwise).
- You need to do this in place.

Note: If you end up using an additional array, you will only receive a partial score.

Example Input :
Input 1:
[[1, 2],[3, 4]]

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

Input 2:
[[1]]

Output 2:
[[1]]

Example Explanation :

Explanation 1:
- After rotating the matrix by 90 degrees:
- 1 goes to 2, 2 goes to 4
- 4 goes to 3, 3 goes to 1

Explanation 2:
- 2D array remains the same as there is the only one element.

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Q14. Are Matrices the same?

Problem Description :

- You are given two matrices A & B of equal dimensions and you have to check whether the two matrices are equal or not.
- Return 1 if both matrices are equal or return 0.

NOTE: Both matrices are equal if A[i][j] == B[i][j] for all i and j
in the given range.

Example Input :

Input 1:
A = [[1, 2, 3],[4, 5, 6],[7, 8, 9]]
B = [[1, 2, 3],[4, 5, 6],[7, 8, 9]]

Output 1:
1

Input 2:
A = [[1, 2, 3],[4, 5, 6],[7, 8, 9]]
B = [[1, 2, 3],[7, 8, 9],[4, 5, 6]]

Output 2:
0

Example Explanation:

Explanation 1:
- All the elements of both matrices are equal at respective positions.

Explanation 2:
- All the elements of both matrices are not equal at their respective positions.

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Q15. Add the matrices

Problem Description:

- You are given two matrices A & B of the same size, you have to return another matrix which is the sum of A and B.

Example Input :

Input :
A = [[1, 2, 3],
[4, 5, 6],
[7, 8, 9]]

B = [[9, 8, 7],
[6, 5, 4],
[3, 2, 1]]

Output :

[[10, 10, 10],
[10, 10, 10],
[10, 10, 10]]

Example Explanation:
A + B = [[1+9, 2+8, 3+7],[4+6, 5+5, 6+4],[7+3, 8+2, 9+1]] = [[10, 10, 10],
[10, 10, 10], [10, 10, 10]].

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Q16. Row to column zero

Problem Description:

- You are given a 2D integer matrix A, make all the elements in a row or column zero if the A[i][j] = 0.
- Specifically, make the entire ith row and jth column zero.

Input:
[1,2,3,4]
[5,6,7,0]
[9,2,0,4]

Output 1:
[1,2,0,0]
[0,0,0,0]
[0,0,0,0]

Explanation :
A[2][4] = A[3][3] = 0, so make 2nd row, 3rd row, 3rd column and 4th column zero.

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Q17. In place prefix sum

Problem Description
- Given an array A of N integers.
- Construct the prefix sum of the array in the given array itself.
- Return an array of integers denoting the prefix sum of the given array.

Example Input

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

Input 2:
A = [4, 3, 2]

Example Output

Output 1:
[1, 3, 6, 10, 15]

Output 2:
[4, 7, 9]

Example Explanation

Explanation 1:

The prefix sum array of [1, 2, 3, 4, 5] is [1, 3, 6, 10, 15].

Explanation 2:

The prefix sum array of [4, 3, 2] is [4, 7, 9].

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Q18 Equilibrium index of the array

Problem Description
- You are given an array A of integers of size N.
- Your task is to find the equilibrium index of the given array
- The equilibrium index of an array is an index such that the sum of elements at lower indexes is equal to the sum of elements at higher indexes.
- If there are no elements that are at lower indexes or at higher indexes, then the corresponding sum of elements is considered as 0.

Note:

Array indexing starts from 0.
If there is no equilibrium index then return -1.
If there is more than one equilibrium index then return the minimum index.

Example Input

Input 1:
A = [-7, 1, 5, 2, -4, 3, 0]

Input 2:
A = [1, 2, 3]

Example Output

Output 1:
3

Output 2:
-1

Example Explanation

Explanation 1:

i	Sum of elements at lower indexes	Sum of elements at higher indexes
0	0	7
1	-7	6
2	-6	1
3	-1	-1
4	1	3
5	-3	0
6	0	0

- 3 is an equilibrium index because
A[0] + A[1] + A[2] = A[4] + A[5] + A[6]

Explanation 2:

i	Sum of elements at lower indexes	Sum of elements at higher indexes
0	0	5
1	1	3
2	3	0

Thus, there is no such index.

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Q19. Product Array puzzle

- Given an array of integers A, find and return the product array of the same size where the ith element of the product array will be equal to the product of all the elements divided by the ith element of the array.

Note: It is always possible to form the product array with integer (32-bit) values. Solve it without using the division operator.

- Return the product array.

Input 1:
A = [1, 2, 3, 4, 5]
Output 1:
[120, 60, 40, 30, 24]

Input 2:
A = [5, 1, 10, 1]
Output 2:
[10, 50, 5, 50]

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Q20. Even numbers in a range

Problem Description
- You are given an array A of length N and Q queries given by the 2D array B of size Q×2.
- Each query consists of two integers B[i][0] and B[i][1].
- For every query, your task is to find the count of even numbers in the range from A[B[i][0]] to A[B[i][1]].

Input Format
- First argument A is an array of integers.
- Second argument B is a 2D array of integers.

Output Format
- Return an array of integers.

Example Input
Input 1:
A = [1, 2, 3, 4, 5]
B = [[0, 2]
[2, 4]
[1, 4]]

Input 2:
A = [2, 1, 8, 3, 9, 6]
B = [[0, 3]
[3, 5]
[1, 3]
[2, 4]]

Example Output
Output 1:
[1, 1, 2]

Output 2:

[2, 1, 1, 1]

Example Explanation

For Input 1:

- The subarray for the first query is [1, 2, 3] (index 0 to 2) which contains 1 even number.
- The subarray for the second query is [3, 4, 5] (index 2 to 4) which contains 1 even number.
- The subarray for the third query is [2, 3, 4, 5] (index 1 to 4) which contains 2 even numbers.

For Input 2:

- The subarray for the first query is [2, 1, 8, 3] (index 0 to 3) which contains 2 even numbers.
- The subarray for the second query is [3, 9, 6] (index 3 to 5) which contains 1 even number.
- The subarray for the third query is [1, 8, 3] (index 1 to 3) which contains 1 even number.
- The subarray for the fourth query is [8, 3, 9] (index 2 to 4) which contains 1 even number.

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Q21. Range Sum Query

Problem Description

- You are given an integer array A of length N.
- You are also given a 2D integer array B with dimensions M x 2, where each row denotes a [L, R] query.
- For each query, you have to find the sum of all elements from L to R indices in A (0 - indexed).
- More formally, find A[L] + A[L + 1] + A[L + 2] +... + A[R - 1] + A[R] for each query.

Input Format

- The first argument is the integer array A.
- The second argument is the 2D integer array B.

Output Format

- Return an integer array of length M where the ith element is the answer for ith query in B.

Example Input
Input 1:

A = [1, 2, 3, 4, 5]
B = [[0, 3], [1, 2]]

Input 2:
A = [2, 2, 2]
B = [[0, 0], [1, 2]]

Example Output
Output 1:
[10, 5]

Output 2:
[2, 4]

Example Explanation

Explanation 1:
-The sum of all elements of A[0 ... 3] = 1 + 2 + 3 + 4 = 10.
- The sum of all elements of A[1 ... 2] = 2 + 3 = 5.

Explanation 2:
- The sum of all elements of A[0 ... 0] = 2 = 2.
- The sum of all elements of A[1 ... 2] = 2 + 2 = 4.

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Q22. Special Subsequences "AG"

Problem Description:
- You have given a string A having Uppercase English letters.
- You have to find how many times the subsequence "AG" is there in the given string.
- Return the count of(i,j) such that,
a)i<j
b) s[i] = 'A' and s[j] = 'G'

Example Input

Input 1:
A = "ABCGAG"

Input 2:
A = "GAB"

Example Output

Output 1:
3

Output 2:
0

Example Explanation

Explanation 1:
- Subsequence "AG" is 3 times in a given string

Explanation 2:
- There is no subsequence "AG" in the given string.

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Q23. Leaders in Array:

Problem Description:

- Given an integer array A containing N distinct integers, you have to find all the leaders in array A.
- An element is a leader if it is strictly greater than all the elements to its right side.

NOTE: The rightmost element is always a leader.
NOTE: Ordering in the output doesn't matter.

Example Input
A = [16, 17, 4, 3, 5, 2]

Example Output
[17, 2, 5]

Example Explanation
- Element 17 is strictly greater than all the elements on the right side to it.
- Element 2 is strictly greater than all the elements on the right side to it.
- Element 5 is strictly greater than all the elements on the right side to it.
- So we will return these three elements i.e [17, 2, 5], we can also return [2, 5, 17] or [5, 2, 17] or any other ordering.

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Q24. The sum of All Subarrays

Problem Description

- You are given an integer array A of length N.
- You have to find the sum of all subarray sums of A.
- Return a single integer denoting the sum of all subarray sums of the given array.

Example Input

Input 1:
A = [1, 2, 3]

Output 1:
20

Input 2:
A = [2, 1, 3]

Output 2:
19

Example Explanation

Explanation 1:
- The different subarrays for the given array are:
  [1], [2], [3], [1, 2], [2, 3], [1, 2, 3].
- Their sums are: 1 + 2 + 3 + 3 + 5 + 6 = 20

Explanation 2:
- Similiar to the first example, the sum of all subarray sums for this array is 19.

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Q25. Good Subarray

Problem Description

- Given an array of integers A, a subarray of an array is said to be good if it fulfills any one of the criteria:

1. Length of the subarray is be even, and the sum of all the elements of the subarray must be less than B.
2. Length of the subarray is be odd, and the sum of all the elements of the subarray must be greater than B.

- Your task is to find the count of good subarrays in A.
- Return the count of good subarrays in A.

Example Input

Input 1:
A = [1, 2, 3, 4, 5]
B = 4

Output 1:
6

Input 2:
A = [13, 16, 16, 15, 9, 16, 2, 7, 6, 17, 3, 9]
B = 65

Output 2:
36

Example Explanation

Explanation 1:
- Even length good subarrays = {1, 2}
- Odd length good subarrays =
  {1, 2, 3}, {1, 2, 3, 4, 5}, {2, 3, 4}, {3, 4, 5}, {5}