

Prep-Sheet



POWERED BY  **CODING
NINJAS**

1. Given an array "A" of N integers, you have also defined the new array "B" as a concatenation of array "A" for an infinite number of times. For example, if the given array "A" is [1,2,3] then, the infinite array "B" is [1,2,3,1,2,3,1,2,3....].

Now you are given Q queries, each query consists of two integers "L" and "R" (1 based indexing). Your task is to find the sum of the subarray from index "L" to "R" (both inclusive) in the infinite array "B" for each query.

Note:

The value of the sum can be very large, return the answer as modulus 10^9+7 .

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2. You are given an integer array 'ARR' of size 'N' and an integer 'S'. Your task is to return the list of all pairs of elements such that each sum of elements of each pair equals 'S'.

Note:

Each pair should be sorted i.e the first value should be less than or equals to the second value.

Return the list of pairs sorted in non-decreasing order of their first value. In case if two pairs have the same first value, the pair with a smaller second value should come first.

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3. You are given an array (ARR) of length N , consisting of integers. You have to find the sum of the subarray (including empty subarray) having maximum sum among, all subarrays.

A subarray is a contiguous segment of an array. In other words, a subarray can be formed by removing 0 or more integers from the beginning, and 0 or more integers from the end of an array.

Note:

The sum of an empty subarray is 0.

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4. Ninja has been given a binary string 'STR' containing either '0' or '1'. A binary string is called beautiful if it contains alternating 0s and 1s.

For Example:

"0101", "1010", "101", "010" are beautiful strings. He wants to make 'STR' beautiful by performing some operations on it. In one operation, Ninja can convert '0' into '1' or vice versa. Your task is to determine the minimum number of operations Ninja should perform to make 'STR' beautiful.

make 'STRO'. At index of which is a Minimum operations to make 'STR' 0010' beautiful is '1'. In one operation, we can convert '0' at index '0' (0-based indexing) to '1'. The 'STR' now becomes 1010' which is a beautiful string.

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5. Yogesh is a very intelligent student and is interested in research in the Machine Learning domain. His college has only one professor, Mr. Peter working in that field. He approaches the professor for the same, but the professor wants to test him first. To pass the test Yogesh must answer Q questions correctly. In all the Q questions, the professor gives him three positive integers : A, B and K where $A \leq B$. Now Yogesh has to find an integer P such that it is closest to integer A and there are at least K prime numbers in range $[A, P]$, where $A \leq P \leq B$.

Help Yogesh to find and print the minimum possible P or print -1 if there is no such possible integer.

Note:

A prime number is a natural number greater than 1 that has no positive divisors other than 1 and itself.

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6. You are given an array 'ARR' of integers of length N. Your task is to find the first missing positive integer in linear time and constant space. In other words, find the lowest positive integer that does not exist in the array. The array can have negative numbers as well.

For Example:

the input [3, 4, -1, 1] should give output 2 because it is the smallest positive number that is missing in the input array.

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7. You are given an array 'ARR' of integers of length N. Your task is to find the first missing positive integer in linear time and constant space. In other words, find the lowest positive integer that does not exist in the array. The array can have negative numbers as well.

For Example:

consider the following binary tree:



For the above tree, the length of the longest path where each node in the path has the same value is 3 and path is 7 -> 7 -> 7 -> 7.

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8. For a given integer array/list 'ARR' of size 'N' containing all distinct values, find the total number of 'Inversions' that may exist. An inversion is defined for a pair of integers in the array/list when the following two conditions are met.

A pair ('ARR[i]', 'ARR[j]') is said to be an inversion when :

1. 'ARR[i] > 'ARR[j]'
2. 'i' < 'j'

Where 'i' and 'j' denote the indices ranging from (0, 'N').

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9. You are given a Singly Linked List of integers and an integer array 'B' of size 'N'. Each element in the array 'B' represents a block size. Modify the linked list by reversing the nodes in each block whose sizes are given by the array 'B'.

Note:

1. If you encounter a situation when 'B [i]' is greater than the number of remaining nodes in the list, then simply reverse the remaining nodes as a block and ignore all the block sizes from 'B [i]'.
2. All block sizes are contiguous i.e. suppose that block 'B [i]' ends at a node cur, then the block 'B [i+1]' starts from the node just after the node cur.

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10. You have been given a 9 X 9 2D matrix 'MATRIX' with some cells filled with digits(1 - 9), and some empty cells (denoted by 0).

You need to find whether there exists a way to fill all the empty cells with some digit(1 - 9) such that the final matrix is a valid Sudoku solution.

A Sudoku solution must satisfy all the following conditions-

1. Each of the digits 1 - 9 must occur exactly once in each row.
2. Each of the digits 1 - 9 must occur exactly once in each column.
3. Each of the digits 1 - 9 must occur exactly once in each of the 9, 3 x 3 sub-matrices of the matrix.

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11. . Given a singly linked list of integers. Your task is to return the head of the reversed linked list.

For Example:

The given linked list is 1 -> 2 -> 3 -> 4-> NULL. Then the reverse linked list is 4 -> 3 -> 2 -> 1 -> NULL and the head of the reversed linked list will be 4.

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12. You are given an integer 'N', your task is to find and return the N'th Fibonacci number using matrix exponentiation.
Since the answer can be very large, return the answer modulo $10^9 + 7$.

Fibonacci Number Is Calculated Using The Following Formula:

$$F(n) = F(n-1) + F(n-2),$$

Where, $F(1) = F(2) = 1$.

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13. You have been given a permutation of 'N' integers. A sequence of 'N' integers is called a permutation if it contains all integers from 1 to 'N' exactly once. Your task is to rearrange the numbers and generate the lexicographically next greater permutation.

To determine which of the two permutations is lexicographically smaller, we compare their first elements of both permutations. If they are equal — compare the second, and so on. If we have two permutations X and Y, then X is lexicographically smaller if $X[i] < Y[i]$, where 'i' is the first index in which the permutations X and Y differ.

For Example:

[2, 1, 3, 4] is lexicographically smaller than [2, 1, 4, 3].

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14. Ninja is planning this 'N' days-long training schedule. Each day, he can perform any one of these three activities. (Running, Fighting Practice or Learning New Moves).

Each activity has some merit points on each day. As Ninja has to improve all his skills, he can't do the same activity in two consecutive days. Can you help Ninja find out the maximum merit points Ninja can earn?

You are given a 2D array of size $N \times 3$ 'POINTS' with the points corresponding to each day and activity. Your task is to calculate the maximum number of merit points that Ninja can earn.

For Example:

If the given 'POINTS' array is $\begin{bmatrix} 1 & 2 & 5 \\ 3 & 1 & 1 \\ 3 & 3 & 3 \end{bmatrix}$, the answer will be 11 as $5 + 3 + 3$.

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15. You are given an array/list ARR consisting of N integers. Your task is to find all the distinct triplets present in the array which add up to a given number K.

An array is said to have a triplet $\{ARR[i], ARR[j], ARR[k]\}$ with $sum = 'K'$ if there exist three indices i, j and k such that $i \neq j, j \neq k$ and $i \neq k$ and $ARR[i] + ARR[j] + ARR[k] = 'K'$.

Note:

1. You can return the list of values in any order. For example, if a valid triplet is $\{1, 2, -3\}$, then $\{2, -3, 1\}, \{-3, 2, 1\}$ etc is also valid triplet. Also, the ordering of different triplets can be random i.e if there are more than one valid triplets, you can return them in any order.
2. The elements in the array need not be distinct.
3. If no such triplet is present in the array, then return an empty list, and the output printed for such a test case will be "-1".

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