Experiment List for Programming Ability and Logic Building-2

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Batch : 2CSE5

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Week : 09/02/26 to 14/02/26

Lecture : 1 & 2

EXPERIMENT 1

Given a sorted array of distinct integers and a target value, return the index if the target is found. If not, return the index where it would be if it were inserted in order.

You must write an algorithm with O(log n) runtime complexity.

Example 1:

nums = [1,3,5,6], target = 5
2

Example 2:

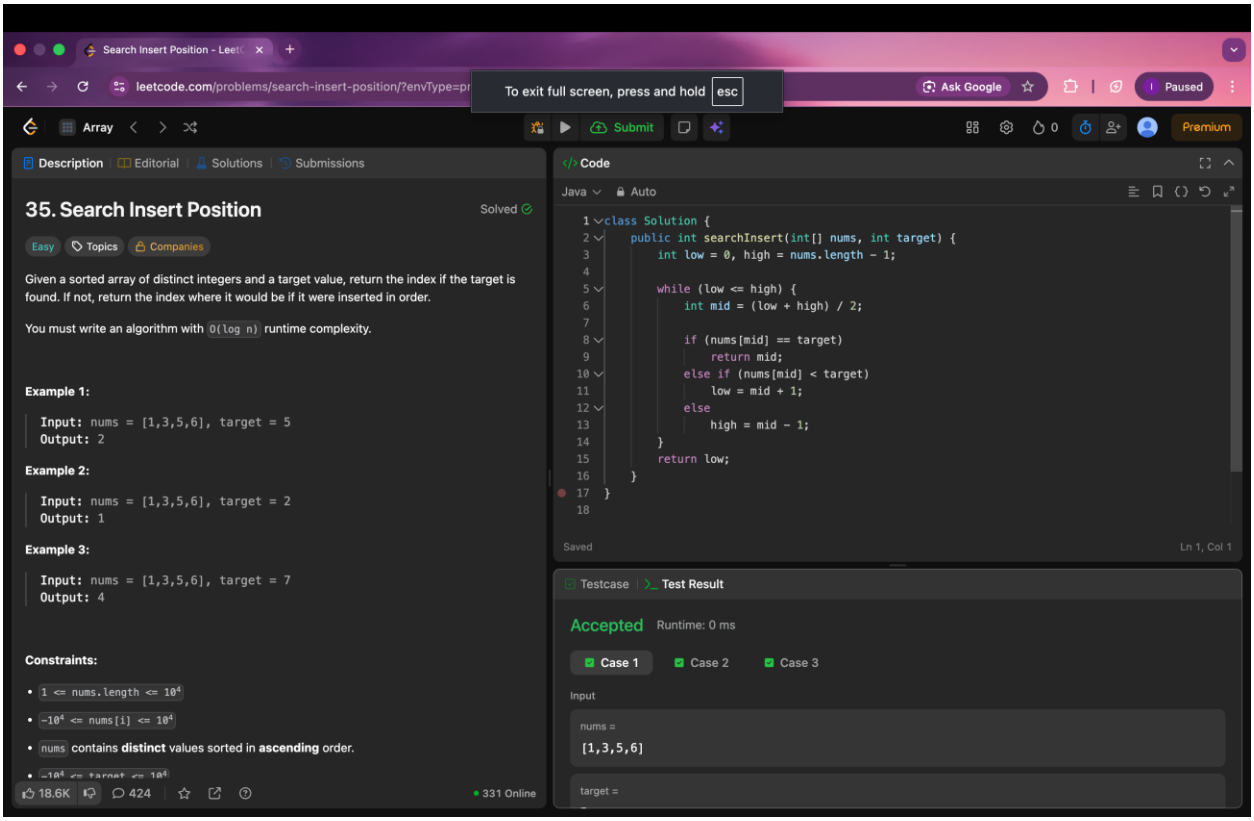
nums = [1,3,5,6], target = 2
1

Example 3:

nums = [1,3,5,6], target = 7
4

Constraints:

- 1 <= nums.length <= 10^4
- -10^4 <= nums[i] <= 10^4
- nums contains **distinct** values sorted in **ascending** order.
- -10^4 <= target <= 10^4



EXPERIMENT 2

Given an array of **distinct** integers candidates and a target integer target, return *a list of all **unique combinations** of* candidates *where the chosen numbers sum to* target. You may return the combinations in **any order**.

The **same** number may be chosen from candidates an **unlimited number of times**. Two combinations are unique if the frequency of at least one of the chosen numbers is different.

The test cases are generated such that the number of unique combinations that sum up to target is less than 150 combinations for the given input.

Example 1:

candidates = [2,3,6,7], target = 7
[[2,2,3],[7]]

2 and 3 are candidates, and 2 + 2 + 3 = 7. Note that 2 can be used multiple times.
7 is a candidate, and 7 = 7.

These are the only two combinations.

Example 2:

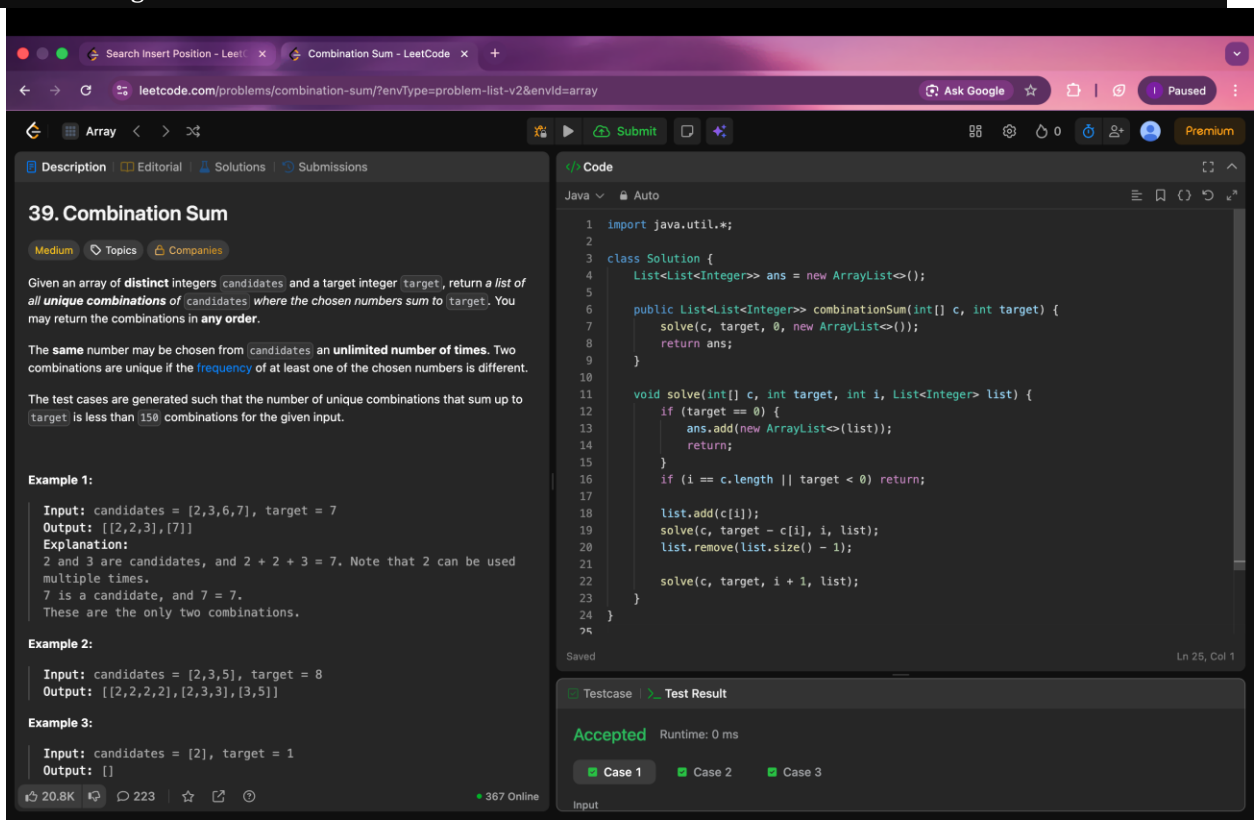
candidates = [2,3,5], target = 8
[[2,2,2,2],[2,3,3],[3,5]]

Example 3:

candidates = [2], target = 1
[]

Constraints:

- 1 <= candidates.length <= 30
- 2 <= candidates[i] <= 40
- All elements of candidates are **distinct**.
- 1 <= target <= 40



EXPERIMENT 3

Given a collection of candidate numbers (candidates) and a target number (target), find all unique combinations in candidates where the candidate numbers sum to target.

Each number in candidates may only be used **once** in the combination.

Note: The solution set must not contain duplicate combinations.

Example 1:

candidates = [10,1,2,7,6,1,5], target = 8

[
[1,1,6],
[1,2,5],
[1,7],
[2,6]
]

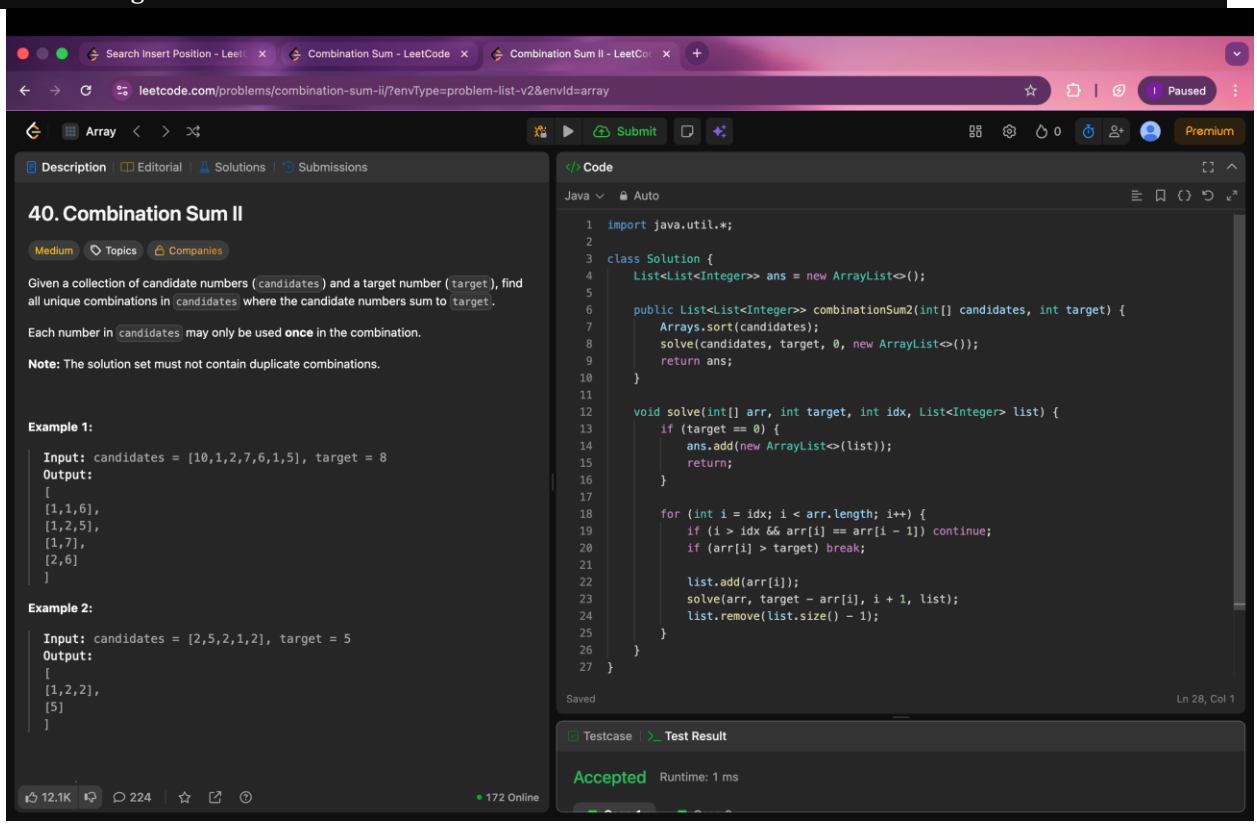
Example 2:

candidates = [2,5,2,1,2], target = 5

[
[1,2,2],
[5]
]

Constraints:

- 1 <= candidates.length <= 100
- 1 <= candidates[i] <= 50
- 1 <= target <= 30



EXPERIMENT 4

You are given a **0-indexed** array of integers nums of length n. You are initially positioned at index 0.

Each element nums[i] represents the maximum length of a forward jump from index i. In other words, if you are at index i, you can jump to any index (i + j) where:

- 0 <= j <= nums[i] and
- i + j < n

Return *the minimum number of jumps to reach index* n - 1. The test cases are generated such that you can reach index n - 1.

Example 1:

nums = [2,3,1,1,4]
2

The minimum number of jumps to reach the last index is 2. Jump 1 step from index 0 to 1, then 3 steps to the last index.

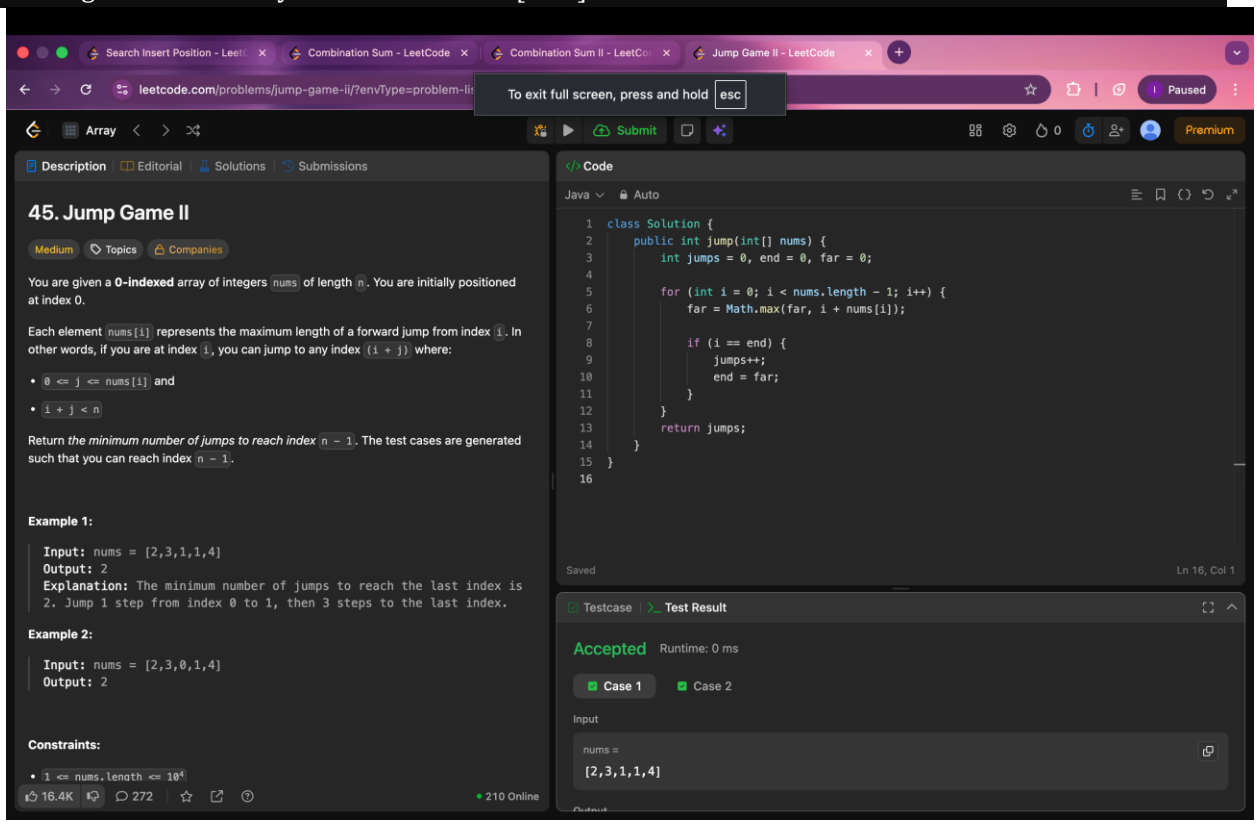
Example 2:

nums = [2,3,0,1,4]
2

Constraints:

- 1 <= nums.length <= 10^4

- 0 <= nums[i] <= 100
- It's guaranteed that you can reach nums[n - 1].



EXPERIMENT 5

Given an array of strings strs, group the anagrams together. You can return the answer in **any order**.

Example 1:

Input: strs = ["eat","tea","tan","ate","nat","bat"]

Output: [["bat"],["nat","tan"],["ate","eat","tea"]]

Explanation:

- There is no string in strs that can be rearranged to form "bat".
- The strings "nat" and "tan" are anagrams as they can be rearranged to form each other.
- The strings "ate", "eat", and "tea" are anagrams as they can be rearranged to form each other.

Example 2:

Input: strs = [""]

Output: [[""]]

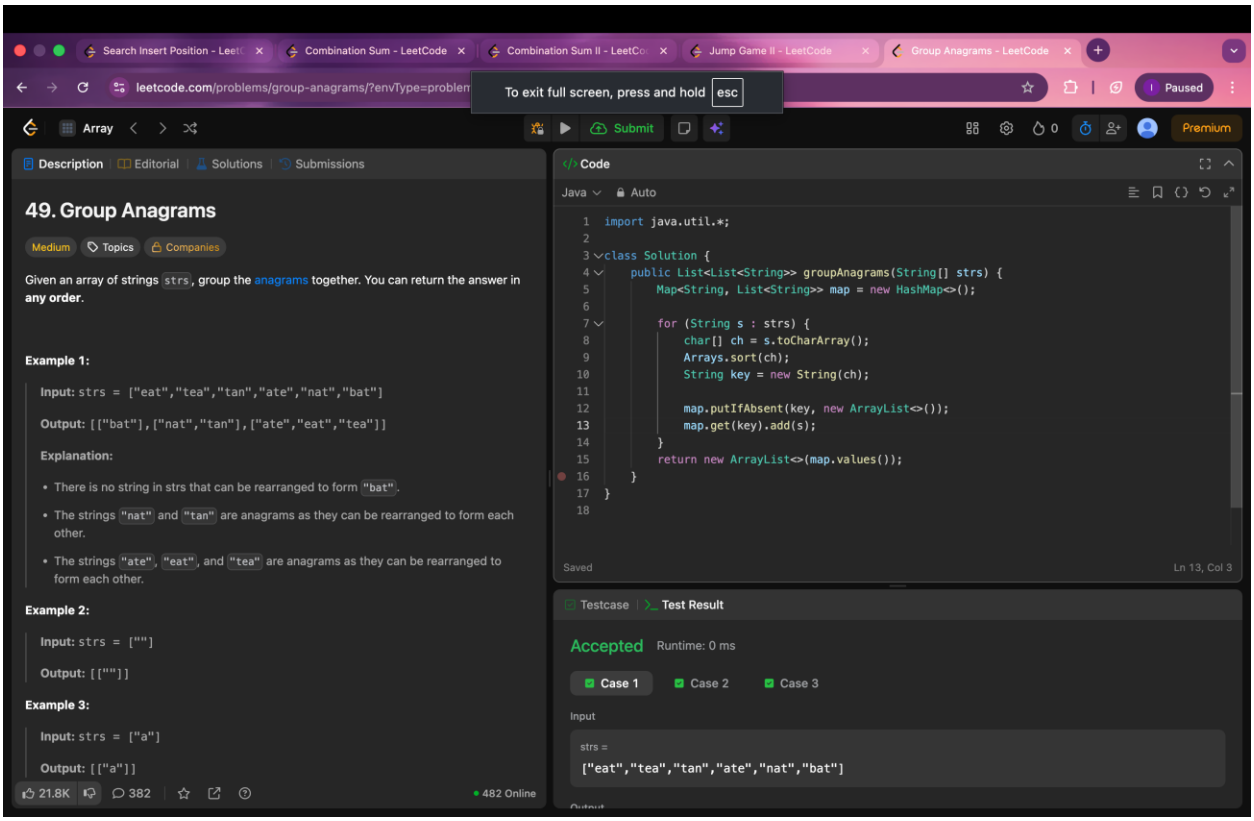
Example 3:

Input: strs = ["a"]

Output: [["a"]]

Constraints:

- 1 <= strs.length <= 10^4
- 0 <= strs[i].length <= 100
- strs[i] consists of lowercase English letters.



EXPERIMENT 6

You are given a **large integer** represented as an integer array digits, where each digits[i] is the i_{th} digit of the integer. The digits are ordered from most significant to least significant in left-to-right order. The large integer does not contain any leading 0's.

Increment the large integer by one and return *the resulting array of digits*.

Example 1:

digits = [1,2,3]
[1,2,4]
The array represents the integer 123.
Incrementing by one gives 123 + 1 = 124.
Thus, the result should be [1,2,4].

Example 2:

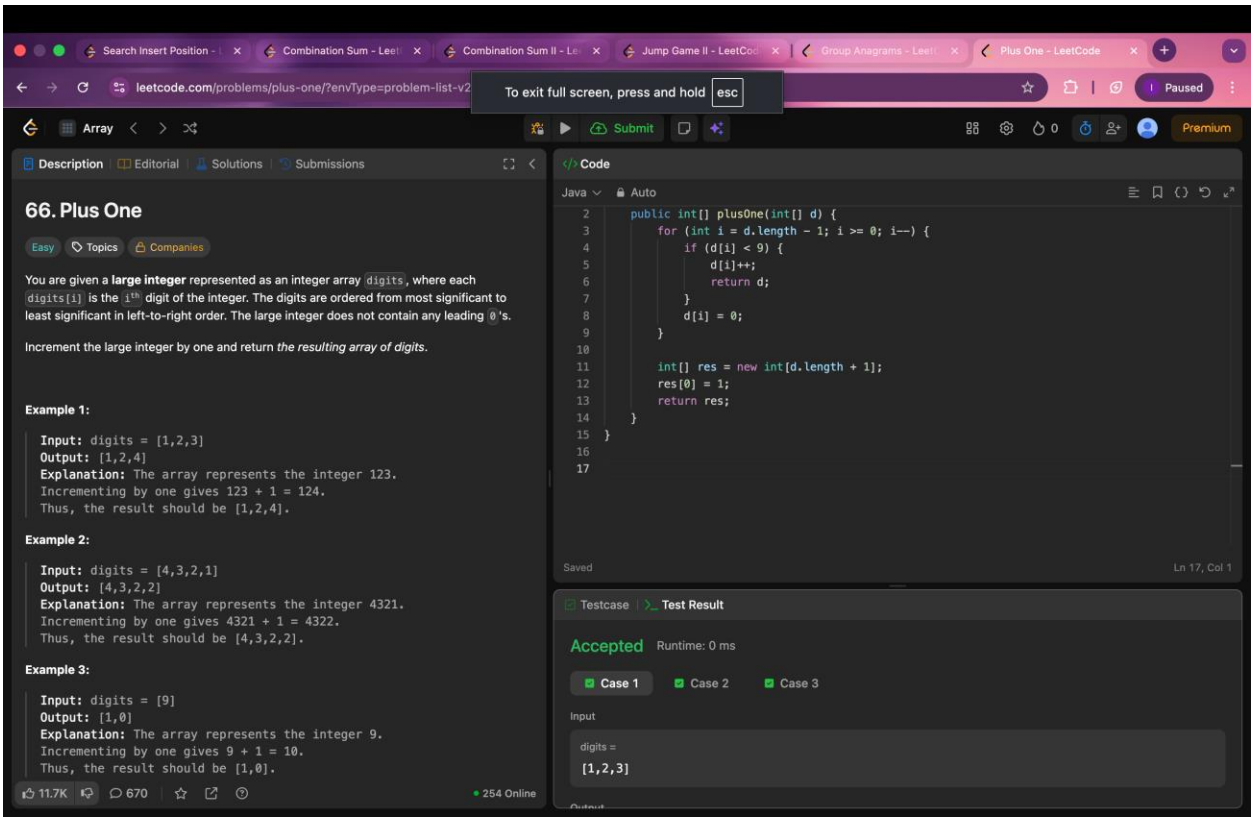
digits = [4,3,2,1]
[4,3,2,2]
The array represents the integer 4321.
Incrementing by one gives 4321 + 1 = 4322.
Thus, the result should be [4,3,2,2].

Example 3:

digits = [9]
[1,0]
The array represents the integer 9.
Incrementing by one gives 9 + 1 = 10.
Thus, the result should be [1,0].

Constraints:

- 1 <= digits.length <= 100
- 0 <= digits[i] <= 9
- digits does not contain any leading 0's.

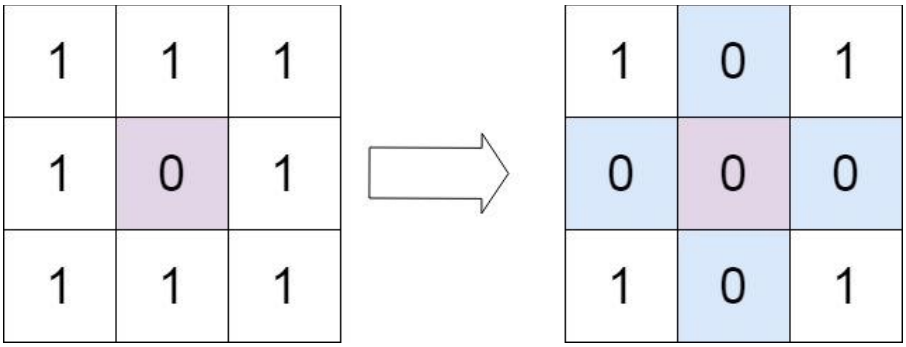


EXPERIMENT 7

Given an m x n integer matrix matrix, if an element is 0, set its entire row and column to 0's.

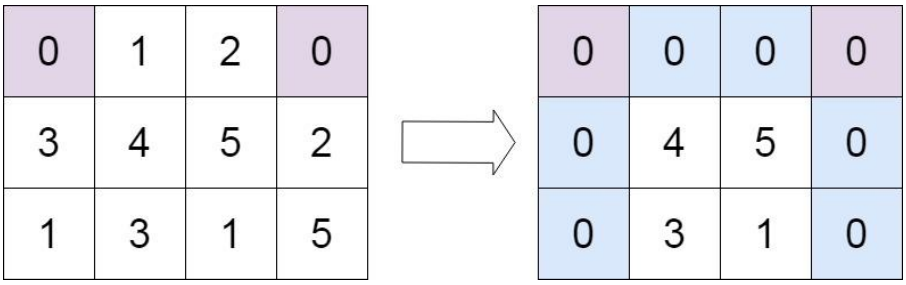
You must do it in place.

Example 1:



matrix =
[[1,1,1],[1,0,1],[1,1,1]]
[[1,0,1],[0,0,0],[1,0,1]]

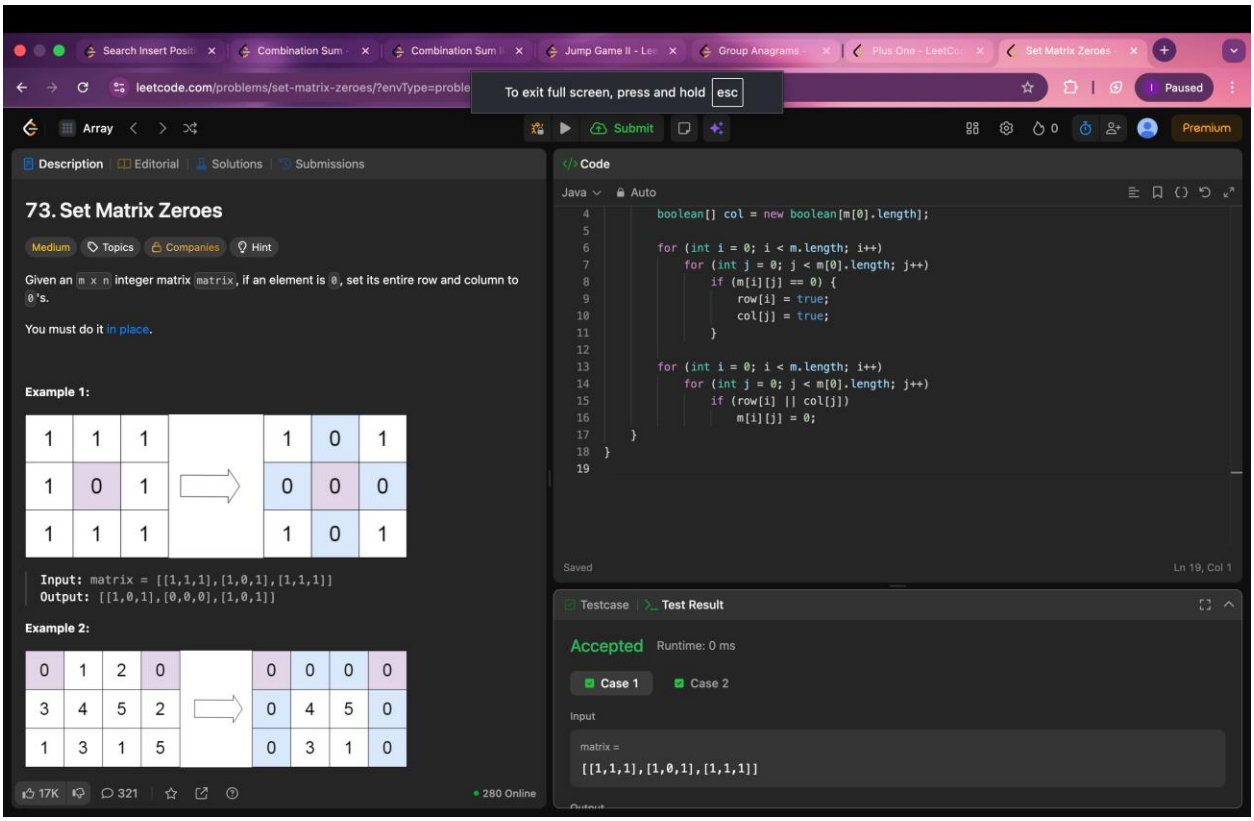
Example 2:



matrix =
[[0,1,2,0],[3,4,5,2],[1,3,1,5]]
[[0,0,0,0],[0,4,5,0],[0,3,1,0]]

Constraints:

- m == matrix.length
- n == matrix[0].length
- 1 <= m, n <= 200
- -2_{31} <= matrix[i][j] <= 2_{31} - 1



EXPERIMENT 8

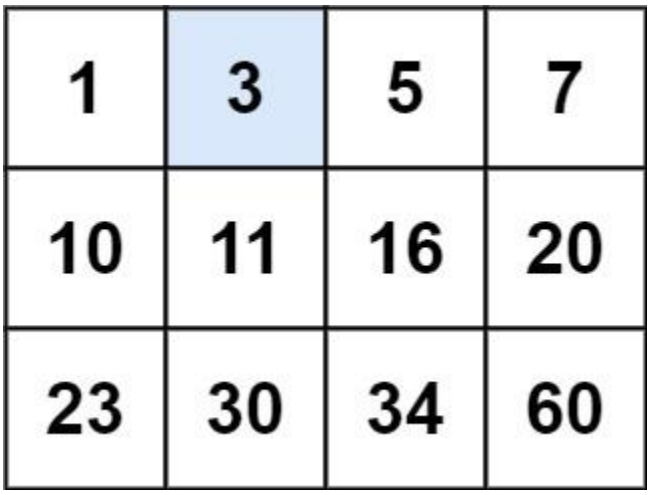
You are given an m x n integer matrix matrix with the following two properties:

- Each row is sorted in non-decreasing order.
- The first integer of each row is greater than the last integer of the previous row.

Given an integer target, return true *if* target *is in* matrix *or* false *otherwise*.

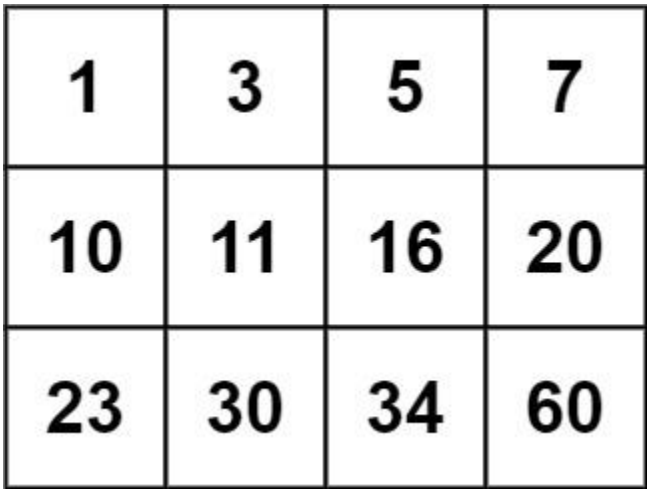
You must write a solution in O(log(m * n)) time complexity.

Example 1:



matrix =
[[1,3,5,7],[10,11,16,20],[23,30,34,60]], target = 3
true

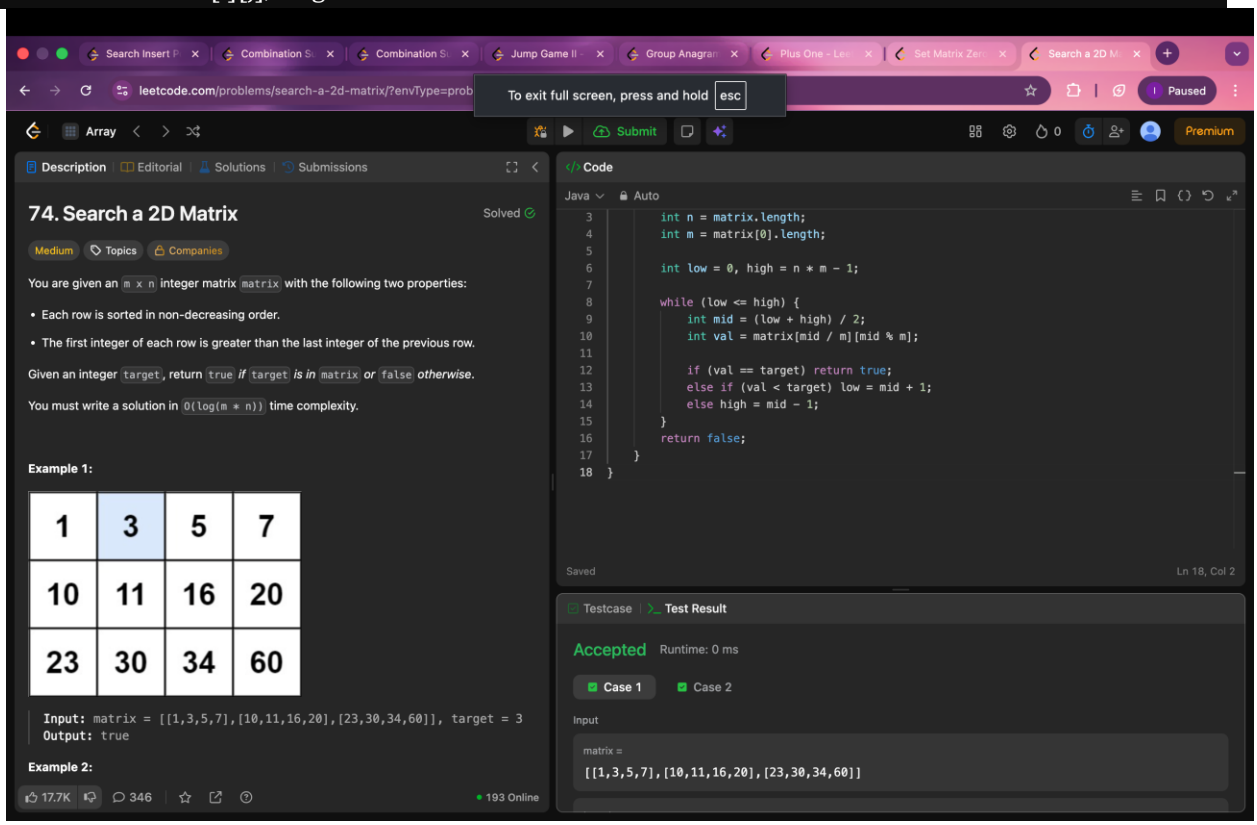
Example 2:



matrix =
[[1,3,5,7],[10,11,16,20],[23,30,34,60]], target = 13
false

Constraints:

- m == matrix.length
- n == matrix[i].length
- 1 <= m, n <= 100
- -10_4 <= matrix[i][j], target <= 10_4



EXPERIMENT 9

Given an array nums with n objects colored red, white, or blue, sort them **in-place** so that objects of the same color are adjacent, with the colors in the order red, white, and blue.

We will use the integers 0, 1, and 2 to represent the color red, white, and blue, respectively.

You must solve this problem without using the library's sort function.

Example 1:

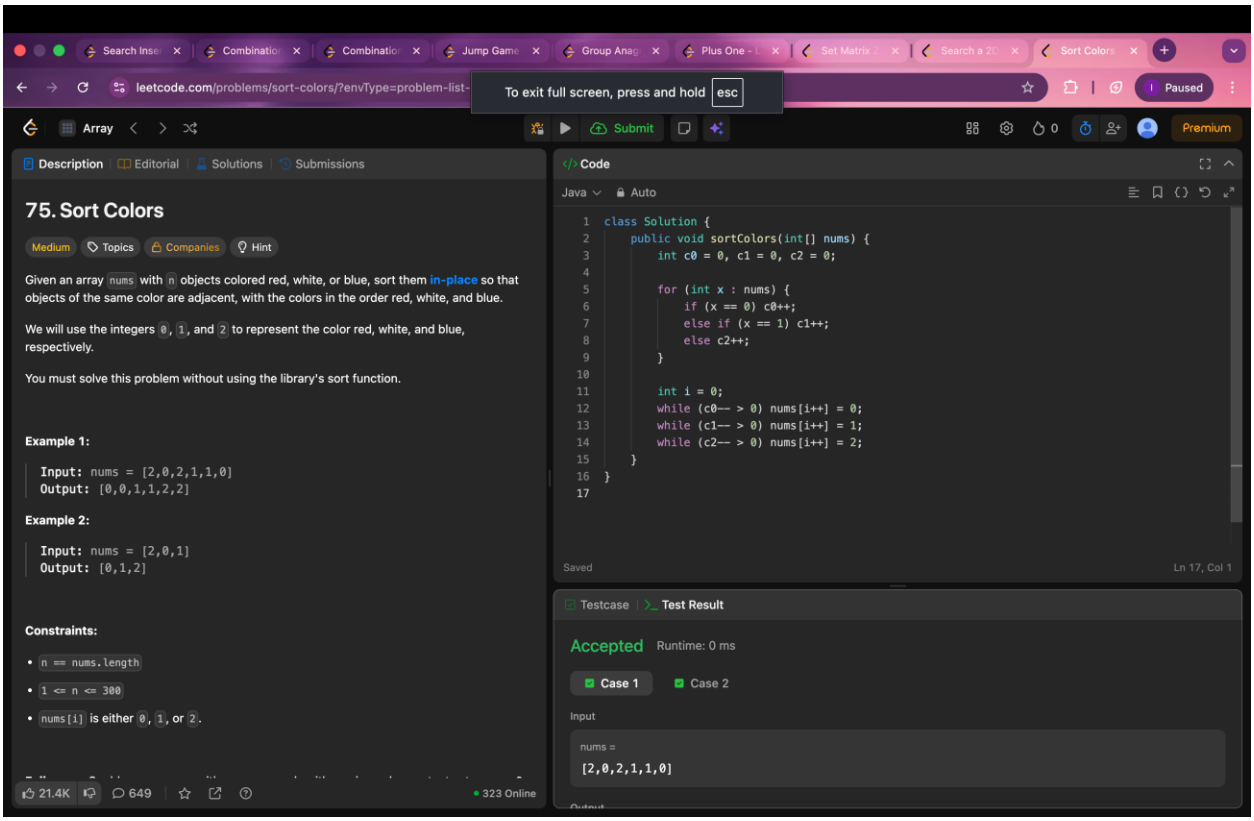
nums = [2,0,2,1,1,0]
[0,0,1,1,2,2]

Example 2:

nums = [2,0,1]
[0,1,2]

Constraints:

- n == nums.length
- 1 <= n <= 300
- nums[i] is either 0, 1, or 2.



EXPERIMENT 10

Given an integer array nums of **unique** elements, return *all possible subsets (the power set)*.

The solution set **must not** contain duplicate subsets. Return the solution in **any order**.

Example 1:

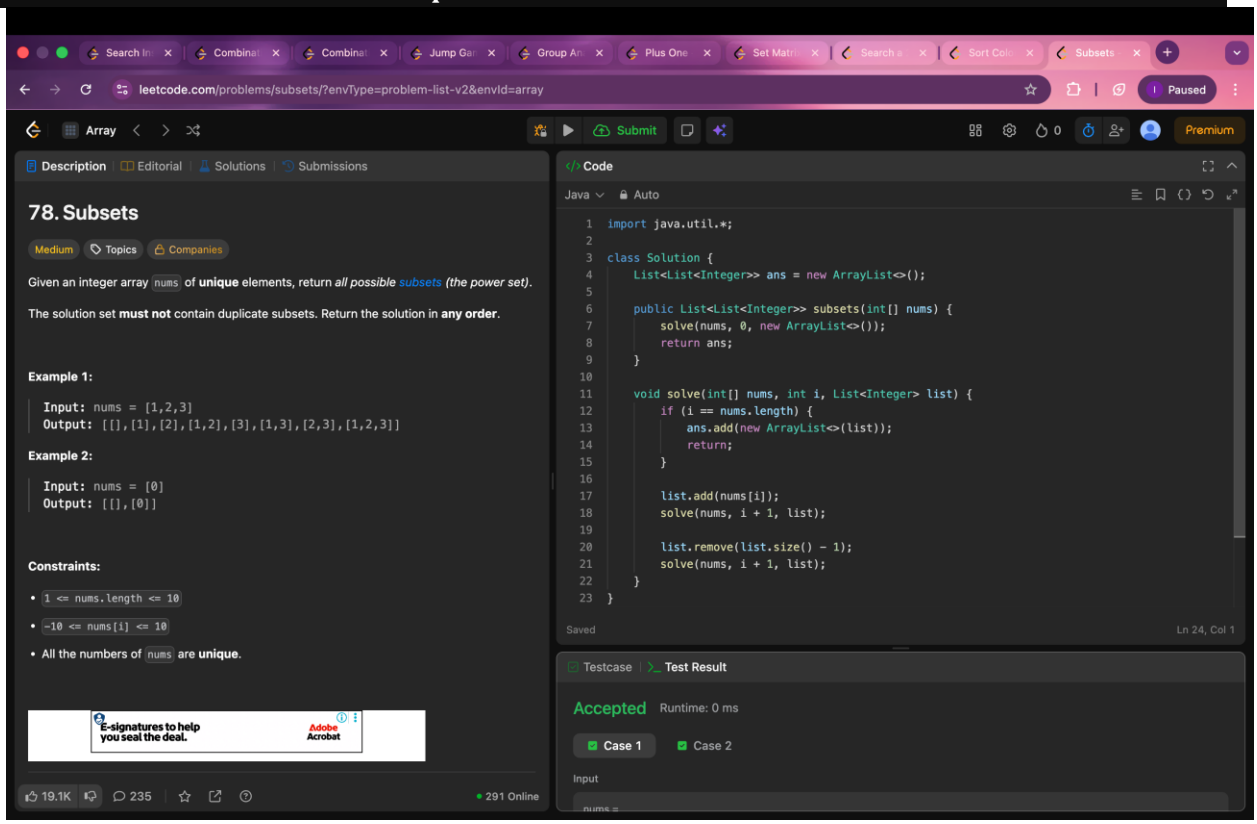
nums = [1,2,3]
[[],[1],[2],[1,2],[3],[1,3],[2,3],[1,2,3]]

Example 2:

nums = [0]
[[],[0]]

Constraints:

- 1 <= nums.length <= 10
- -10 <= nums[i] <= 10
- All the numbers of nums are **unique**.

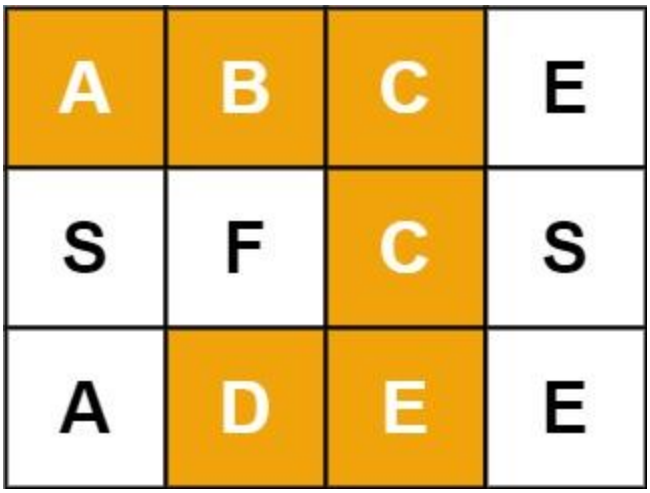


EXPERIMENT 11

Given an m x n grid of characters board and a string word, return true *if* word *exists in the grid*.

The word can be constructed from letters of sequentially adjacent cells, where adjacent cells are horizontally or vertically neighboring. The same letter cell may not be used more than once.

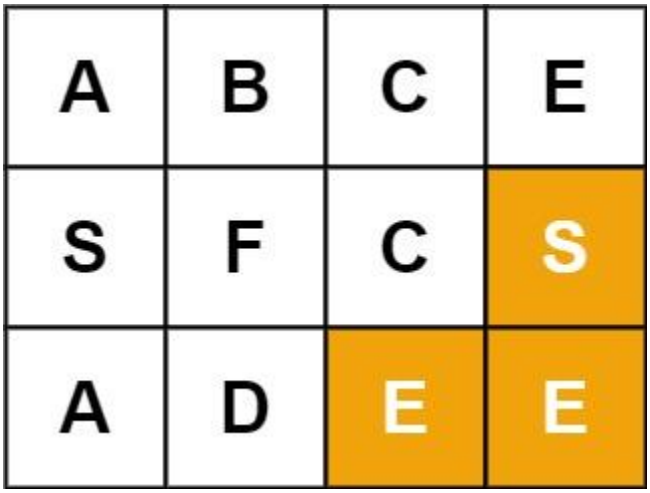
Example 1:



board = [["A","B","C","E"],["S","F","C","S"],["A","D","E","E"]], word = "ABCCED"

true

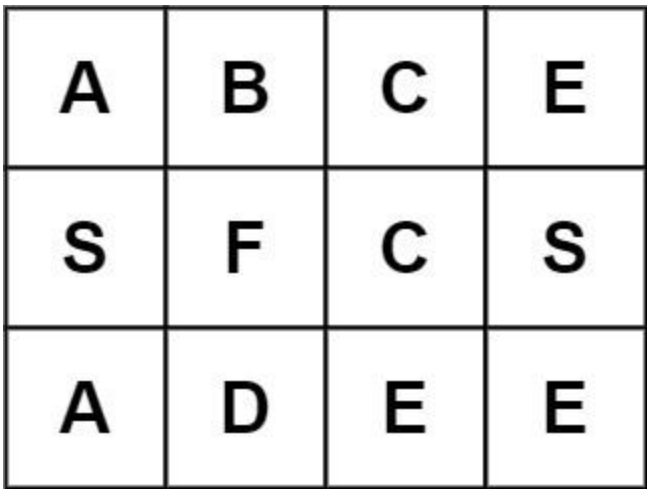
Example 2:



board = [["A","B","C","E"],["S","F","C","S"],["A","D","E","E"]], word = "SEE"

true

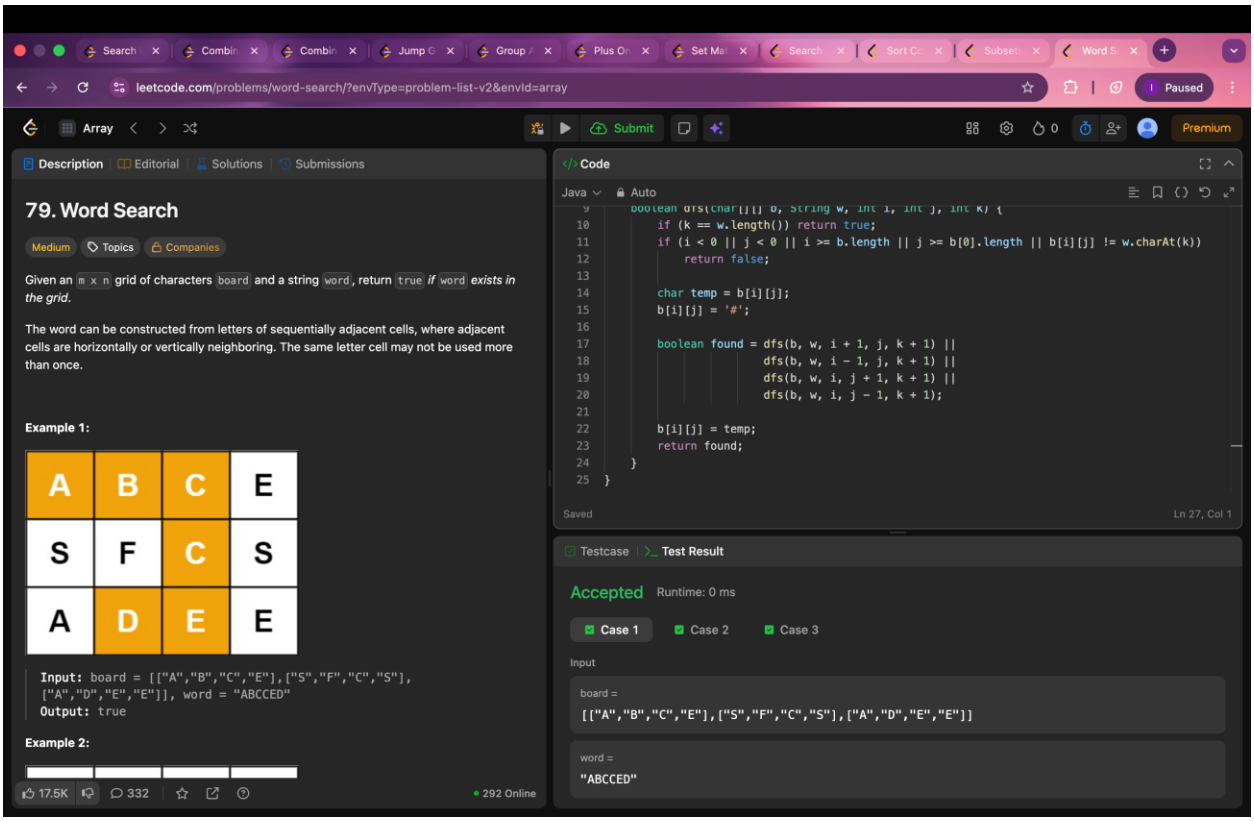
Example 3:



board = [["A","B","C","E"],["S","F","C","S"],["A","D","E","E"]], word = "ABCB"
false

Constraints:

- m == board.length
- n = board[i].length
- 1 <= m, n <= 6
- 1 <= word.length <= 15
- board and word consists of only lowercase and uppercase English letters.



EXPERIMENT 12

Given an array nums of n integers, return *an array of all the **unique** quadruplets* [nums[a], nums[b], nums[c], nums[d]] such that:

- 0 <= a, b, c, d < n
- a, b, c, and d are **distinct**.
- nums[a] + nums[b] + nums[c] + nums[d] == target

You may return the answer in **any order**.

Example 1:

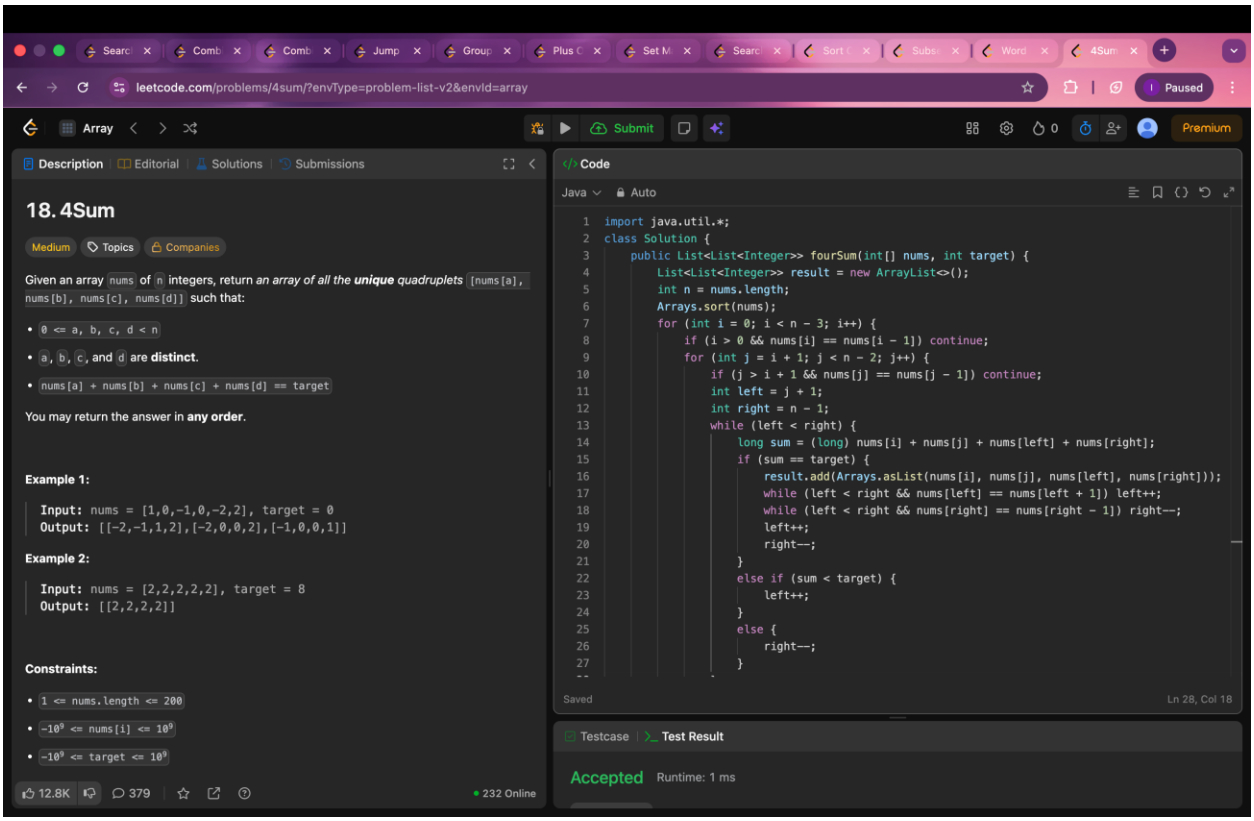
nums = [1,0,-1,0,-2,2], target = 0
[[-2,-1,1,2],[-2,0,0,2],[-1,0,0,1]]

Example 2:

nums = [2,2,2,2,2], target = 8
[[2,2,2,2]]

Constraints:

- 1 <= nums.length <= 200
- -10^9 <= nums[i] <= 10^9
- -10^9 <= target <= 10^9



EXPERIMENT 13

There is an integer array nums sorted in ascending order (with **distinct** values).

Prior to being passed to your function, nums is **possibly left rotated** at an unknown index k (1 <= k < nums.length) such that the resulting array is [nums[k], nums[k+1], ..., nums[n-1], nums[0], nums[1], ..., nums[k-1]] (**0-indexed**). For example, [0,1,2,4,5,6,7] might be left rotated by 3 indices and become [4,5,6,7,0,1,2].

Given the array nums **after** the possible rotation and an integer target, return *the index of* target *if it is in* nums*, or* -1 *if it is not in* nums.

You must write an algorithm with O(log n) runtime complexity.

Example 1:

nums = [4,5,6,7,0,1,2], target = 0
4

Example 2:

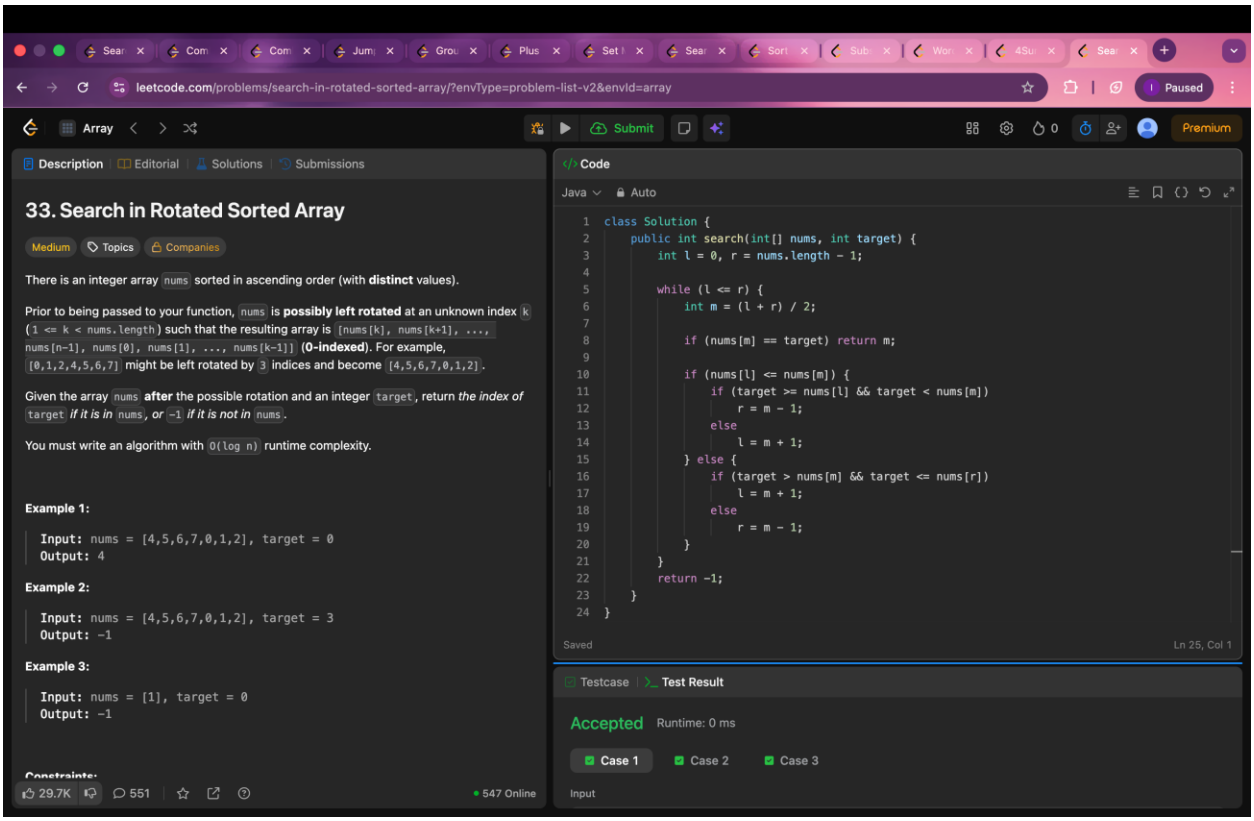
nums = [4,5,6,7,0,1,2], target = 3
-1

Example 3:

nums = [1], target = 0
-1

Constraints:

- 1 <= nums.length <= 5000
- -10^4 <= nums[i] <= 10^4
- All values of nums are **unique**.
- nums is an ascending array that is possibly rotated.
- -10^4 <= target <= 10^4



EXPERIMENT 14

Given an array of integers nums sorted in non-decreasing order, find the starting and ending position of a given target value.

If target is not found in the array, return [-1, -1].

You must write an algorithm with O(log n) runtime complexity.

Example 1:

nums = [5,7,7,8,8,10], target = 8
[3,4]

Example 2:

nums = [5,7,7,8,8,10], target = 6
[-1,-1]

Example 3:

nums = [], target = 0
[-1,-1]

Constraints:

- 0 <= nums.length <= 10^5
- -10^9 <= nums[i] <= 10^9
- nums is a non-decreasing array.

- -10^9 <= target <= 10^9