



JAVA **BinarySearch**

Assignment Questions



Q1. Given a sorted array of n elements and a target 'x'. Find the last occurrence of 'x' in the array. If 'x' does not exist return -1.

Input 1: `arr[] = {1,2,3,3,4,4,4,5}` , `x = 4`

Output 1: 6

Q2. Given a sorted binary array, efficiently count the total number of 1's in it.

Input 1: `a = [0,0,0,0,1,1]`

Output 1: 2

Q3. Given a matrix having 0-1 only where each row is sorted in increasing order, find the row with the maximum number of 1's.

Input matrix : 0 1 1 1

0 0 1 1

1 1 1 1 // this row has maximum 1s

0 0 0 0

Output: 2

Q4. Given an array of integers `nums` containing $n + 1$ integers where each integer is in the range $[1, n]$ inclusive in sorted order. There is only one repeated number in `nums`, return this repeated number.

Input 1: `arr[] = {1,2,3,3,4}`

Output 1: 3

Input 2: `arr[] = {1,2,2,3,4,5}`

Output 2: 2

Q5. Given a number 'n'. Predict whether 'n' is a valid perfect square or not.

Input 1: `n = 36`

Output 1: yes

Input 2: `n = 45`

Output 2: no

Q6. You have n coins and you want to build a staircase with these coins. The staircase consists of k rows where the i th 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.

Example 2:

Input: $n = 8$

Output: 3

Explanation: Because the 4th row is incomplete, we return 3.

Q7. Write a program to apply binary search in array sorted in decreasing order.

Q8. You have a sorted array of infinite numbers, how would you search an element in the array?

Q9. You are given an $m \times n$ 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:

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

Output: true

Example 2:

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

Output: false

Q10. There is an integer array nums sorted in non-decreasing order (not necessarily with distinct values).

Before being passed to your function, nums is rotated at an unknown pivot index k ($0 \leq k < \text{nums.length}$) such that the resulting array is $[\text{nums}[k], \text{nums}[k+1], \dots, \text{nums}[n-1],$

$\text{nums}[0], \text{nums}[1], \dots, \text{nums}[k-1]]$ (0-indexed). For example, $[0,1,2,4,4,4,5,6,6,7]$ might be rotated at pivot index 5 and become $[4,5,6,6,7,0,1,2,4,4]$. Given the array nums after the rotation and an integer target , return true if target is in nums , or false if it is not in nums .

You must decrease the overall operation steps as much as possible.

Example 1:

Input: nums = $[2,5,6,0,0,1,2]$, target = 0

Output: true

Example 2:

Input: nums = $[2,5,6,0,0,1,2]$, target = 3

Output: false



**THANK
YOU !**

