

Binary Search Questions

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🏷️ Tags	

🟢 Easy:

1. Binary Search – Implement binary search on a sorted array.

Problem: Given a sorted array and a target, find if the target exists.

Example: arr = [1, 2, 3, 4, 5], target = 3 → Output: 2

2. First and Last Position of an Element in Sorted Array

Problem: Find the first and last occurrence of a given number in a sorted array.

Example: arr = [5, 7, 7, 8, 8, 10], target = 8 → Output: [3, 4]

3. Find the Square Root (Integer Part)

Problem: Find the integer square root of x without using sqrt().

Example: x = 8 → Output: 2

4. Guess Number Higher or Lower (Leetcode 374)

Problem: Given an API guess(num), find the number between 1 to n that the system has picked.

Example: n = 10, pick = 6 → Output: 6

5. Find Insert Position (Leetcode 35)

Problem: Find the index where a given number should be inserted in a sorted array.

Example: arr = [1,3,5,6], target = 5 → Output: 2

🟡 Medium:

1. Search in Rotated Sorted Array (Leetcode 33)

Problem: Find an element in a rotated sorted array.

Example: $arr = [4, 5, 6, 7, 0, 1, 2]$, $target = 0 \rightarrow$ Output: 4

2. Find Peak Element (Leetcode 162)

Problem: Given an array where $arr[i] \neq arr[i+1]$, find a peak element.

Example: $arr = [1, 2, 3, 1] \rightarrow$ Output: 2

3. Find Minimum in Rotated Sorted Array (Leetcode 153)

Problem: Find the minimum element in a rotated sorted array.

Example: $arr = [3, 4, 5, 1, 2] \rightarrow$ Output: 1

4. Find Kth Smallest Element in Sorted Matrix (Leetcode 378)

Problem: Find the k-th smallest element in a sorted matrix.

Example:

$matrix = [[1, 5, 9], [10, 11, 13], [12, 13, 15]]$, $k = 8$
 \rightarrow Output: 13

5. Capacity To Ship Packages Within D Days (Leetcode 1011)

Problem: Given weights of packages and days, find the minimum weight capacity of a ship to ship all packages within D days.

Example: $weights = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]$, $D = 5 \rightarrow$ Output: 15

6. Split Array Largest Sum (Leetcode 410)

Problem: Split the array into m subarrays such that the maximum sum among them is minimized.

Example: $arr = [7, 2, 5, 10, 8]$, $m = 2 \rightarrow$ Output: 18

Hard:

1. **Median of Two Sorted Arrays (Leetcode 4)**

Problem: Find the median of two sorted arrays in $O(\log(\min(m, n)))$.

Example: arr1 = [1, 3], arr2 = [2] → Output: 2.0

2. **Aggressive Cows (SPOJ - AGGRCOW)**

Problem: Given n stalls, place c cows such that the minimum distance between any two cows is maximized.

Example: stalls = [1,2,8,4,9], c = 3 → Output: 3

3. **Painters Partition Problem**

Problem: Given n boards and k painters, find the minimum time required to paint all boards if a painter can paint only consecutive boards.

Example: boards = [10, 20, 30, 40], k = 2 → Output: 60

4. **Book Allocation Problem**

Problem: Given n books with pages and m students, allocate books such that the maximum pages assigned to a student is minimized.

Example: pages = [12, 34, 67, 90], m = 2 → Output: 113

5. **Maximum Number of Removable Characters (Leetcode 1898)**

Problem: You have two strings s and p. Find the maximum number of characters you can remove from s such that p is still a subsequence of s.

Example: s = "abcacb", p = "ab", removable = [3,1,0] → Output: 2

6. **Closest Pair from Two Sorted Arrays**

Problem: Given two sorted arrays and a target sum, find the pair with the closest sum to the target.

Example: arr1 = [1, 4, 5, 7], arr2 = [10, 20, 30, 40], target = 32 → Output: (7, 30)

7. Find Smallest Divisor Given a Threshold (Leetcode 1283)

Problem: Given an array and a threshold, find the smallest divisor such that the sum of all divisions is \leq threshold.

Example: nums = [1, 2, 5, 9], threshold = 6 \rightarrow Output: 5