



Binary Search based top 15 problem commonly asked in interview questions.

give input and output of the problem.

list 5 easy, 5 medium, 5 hard difficulty problems.

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Sure! Here's a list of binary search-based problems commonly asked in interviews, categorized by difficulty. For each problem, I'll include an example input and output.

## Easy

### 1. Binary Search in a Sorted Array

- **Problem:** Given a sorted array and a target value, return the index of the target value using binary search.



- **Input:** `[1, 2, 3, 4, 5]`, target = `3`

- **Output:** `2`



Get citation

### 2. Find the First Occurrence of a Target Value

- **Problem:** Given a sorted array and a target value, find the first occurrence of the target value.

- **Input:** `[1, 2, 4, 4, 4, 5]`, target = `4`

- **Output:** `2`

### 3. Find the Last Occurrence of a Target Value

- **Problem:** Given a sorted array and a target value, find the last occurrence of the target value.

- **Input:** `[1, 2, 4, 4, 4, 5]`, target = `4`

- **Output:** `4`

### 4. Find the Position to Insert a Target Value



- **Problem:** Given a sorted array and a target value, find the position at which the target value should be inserted.

- **Input:** `[1, 3, 5, 6]`, target = `5`

- **Output:** `2`

### 5. Search Insert Position in Sorted Array

- **Problem:** Given a sorted array and a target value, return the index where the target should be inserted in order.

- **Input:** `[1, 3, 5, 6]`, target = `2`

- **Output:** `1`

## Medium

### 1. Rotated Sorted Array Search

- **Problem:** Given a rotated sorted array and a target value, find the index of the target value.

- **Input:** `[4, 5, 6, 7, 0, 1, 2]`, target = `0`



- **Output:** `4`

### 2. Find Minimum in Rotated Sorted Array

- **Problem:** Given a rotated sorted array, find the minimum element in the array.

- **Input:** `[4, 5, 6, 7, 0, 1, 2]`

- **Output:** `0`

### 3. Find Peak Element

- **Problem:** Given an array, find a peak element where the element is greater than its neighbors.
- **Input:** `[1, 3, 5, 6, 4, 2]`
- **Output:** `2` (index of `5`)

#### 4. Search in 2D Matrix

- **Problem:** Given a 2D matrix where each row and column is sorted, search for a target value.
- **Input:** `[[1, 4, 7, 11], [2, 5, 8, 12], [3, 6, 9, 16]]`, target = `5`
- **Output:** `true`

#### 5. Square Root of a Number

- **Problem:** Compute the square root of a non-negative integer `x` using binary search.
- **Input:** `8`
- **Output:** `2` (integer part of the square root)

### Hard

#### 1. Find the Kth Smallest Element in a Sorted Matrix

- **Problem:** Given a `n x n` matrix where each row and column is sorted, find the `k`-th smallest element.
- **Input:** `[[1, 5, 9], [10, 11, 13], [12, 13, 15]]`, `k = 8`
- **Output:** `13`

#### 2. Median of Two Sorted Arrays

- **Problem:** Given two sorted arrays, find the median of the combined sorted array.
- **Input:** `[1, 3]`, `[2]`
- **Output:** `2.0`

#### 3. Find the Smallest Good Base

- **Problem:** Given a number `n`, find the smallest base `k` such that `n` can be represented as `km + k(m-1) + ... + k0` where `m >= 1`.
- **Input:** `13`
- **Output:** `3` (smallest base)

#### 4. Find the Number of Distinct Islands

- **Problem:** Given a grid, find the number of distinct islands. An island is considered distinct if it has a different shape.
- **Input:** `[[1, 1, 0, 0, 0], [0, 1, 0, 0, 1], [0, 0, 0, 1, 1], [0, 0, 0, 0, 0], [0, 0, 0, 0, 0]]`
- **Output:** `2`

#### 5. Find Minimum in Rotated Sorted Array II

- **Problem:** Similar to the previous minimum problem but with duplicate elements allowed.
- **Input:** `[2, 2, 2, 0, 1, 2]`
- **Output:** `0`

These problems will help you get comfortable with various binary search techniques and variations!

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