## Binary Search to find X in sorted array

```
02 April 2025 10:18
```

```
public int search(int[] nums, int target)
{
    int l=0;
    int r=nums.length-1;
    while(l<=r)
    {
        int mid=(l+r)/2;
        if(nums[mid]==target)
        {
            return mid;
        }
        else if(nums[mid]>target)
        {
            r=mid-1;
        }
        else
        {
                  l=mid+1;
        }
        return -1;
}
```

#### **Implement Lower Bound**

02 April 2025 10:20

```
static int findFloor(long arr[], int n, long x)
    Arrays.sort(arr);
    int I=0;
    int r=arr.length-1;
    int ans=-1;
    while(I<=r)
      int mid=(l+r)/2;
      if(arr[mid]==x)
         return mid;
       else if(arr[mid]>x)
         r=mid-1;
       }
       else
         ans=mid;
         l=mid+1;
       }
    return ans;
```

#### Implement Upper Bound

```
02 April 2025 10:24
```

```
public int[] getFloorAndCeil(int x, int[] arr)
     Arrays.sort(arr);
     int[]res=new int[2];
     int I=0;
     int r=arr.length-1;
     int ans=-1;
     while(I<=r)
       int mid=(I+r)/2;
       if(arr[mid]==x)
          ans=arr[mid];
          break;
       else if(arr[mid]>x)
          ans=arr[mid];
          r=mid-1;
       }
       else
        {
          I=mid+1;
       }
     if(ans!=-1)
       res[1]=ans;
     else
       res[1]=-1;
     I=0;
     r=arr.length-1;
     ans=-1;
     while(I<=r)</pre>
       int mid=(I+r)/2;
       if(arr[mid]==x)
          ans=arr[mid];
          break:
       else if(arr[mid]>x)
          r=mid-1;
       else
       {
          ans=arr[mid];
          I=mid+1;
     if(ans!=-1)
```

```
res[0]=ans;
}
else
{
    res[0]=-1;
}
return res;
}
```

#### **Search Insert Position**

```
02 April 2025 10:26
```

```
public int searchInsert(int[] arr, int x)
int I=0;
int r=arr.length-1;
int ans=0;
while(I<=r)
{
int mid=(l+r)/2;
if(arr[mid]==x)
{
//ans=mid;
r=mid-1;
}
else if(arr[mid]>x)
r=mid-1;
}
else
//ans=mid;
I=mid+1;
}
}
return I;
}
```

#### Floor/Ceil in Sorted Array

```
02 April 2025 10:28
```

```
public int[] getFloorAndCeil(int x, int[] arr)
     Arrays.sort(arr);
     int[]res=new int[2];
     int I=0;
     int r=arr.length-1;
     int ans=-1;
     while(I<=r)
       int mid=(I+r)/2;
       if(arr[mid]==x)
          ans=arr[mid];
          break;
       else if(arr[mid]>x)
          ans=arr[mid];
          r=mid-1;
       }
       else
        {
          I=mid+1;
       }
     if(ans!=-1)
       res[1]=ans;
     else
       res[1]=-1;
     I=0;
     r=arr.length-1;
     ans=-1;
     while(I<=r)</pre>
       int mid=(I+r)/2;
       if(arr[mid]==x)
          ans=arr[mid];
          break:
       else if(arr[mid]>x)
          r=mid-1;
       else
          ans=arr[mid];
          I=mid+1;
     if(ans!=-1)
```

```
res[0]=ans;
}
else
{
    res[0]=-1;
}
return res;
}
```

# Find the first or last occurrence of a given number in a sorted array

02 April 2025 10:29

```
public int[] searchRange(int[] arr, int x)
Arrays.sort(arr);
int[]res=new int[2];
int I=0;
int r=arr.length-1;
int ans=-1;
while(I<=r)
{
int mid=(l+r)/2;
if(arr[mid]==x)
{
ans=mid;
I=mid+1;
else if(arr[mid]>x)
{
r=mid-1;
}
else
{
I=mid+1;
}
}
if(ans!=-1)
res[1]=ans;
}
else
res[1]=-1;
}
I=0;
r=arr.length-1;
ans=-1;
while(I<=r)
int mid=(l+r)/2;
if(arr[mid]==x)
ans=mid;
r=mid-1;
else if(arr[mid]>x)
r=mid-1;
```

```
} else
{
l=mid+1;
}
} if(ans!=-1) {
  res[0]=ans;
} else
{
  res[0]=-1;
} return res;
}
```

From < <a href="https://onlinenotepad.org/notepad">https://onlinenotepad.org/notepad</a>>

# Count occurrences of a number in a sorted array with duplicates

```
02 April 2025 10:31
```

```
int count(int[] arr, int n, int x)
    Arrays.sort(arr);
     int[]res=new int[2];
     int I=0;
     int r=arr.length-1;
     int ans=-1;
     while(I<=r)
        int mid=(I+r)/2;
       if(arr[mid]==x)
          ans=mid;
          I=mid+1;
        else if(arr[mid]>x)
          r=mid-1;
        else
        {
          l=mid+1;
       }
     if(ans!=-1)
       res[1]=ans;
     else
       return 0;
     Í=0;
     r=arr.length-1;
     ans=-1;
     while(I<=r)</pre>
        int mid=(I+r)/2;
       if(arr[mid]==x)
          ans=mid;
          r=mid-1;
        else if(arr[mid]>x)
          r=mid-1;
        else
```

```
l=mid+1;
}
if(ans!=-1)
{
    res[0]=ans;
}
else
{
    return 0;
}
return res[1]-res[0]+1;
}
```

```
02 April 2025 10:33
```

```
class Solution {
    public int search(int[] nums,int l,int r, int target)
        while(l<=r)</pre>
             int mid=(1+r)/2;
             if(nums[mid]==target)
             {
                 return mid;
             else if(nums[mid]>target)
                 r=mid-1;
             }
             else
             {
                 l=mid+1;
        return -1;
    public int search(int[] nums, int target)
        int a=0;
        int 1=0;
        int r=nums.length-1;
        if(nums.length==1)
             if(nums[0]==target)
             {
                 return 0;
             return -1;
        }
        while(l<=r)</pre>
             int mid=(1+r)/2;
             if(mid>0&&mid<nums.length-1)</pre>
                 if(nums[mid]<nums[mid-1]&&nums[mid]<nums[mid+1])</pre>
                     a=mid;
                     break;
                 else if(nums[mid]>nums[0])
                     l=mid+1;
                 }
                 else
                     r=mid-1;
             }
```

```
else if(mid==0)
                 if(nums[0]>nums[1])
                 {
                     a=1;
                     break;
                 }
                 else
                 {
                     a=0;
                     break;
                 }
             }
             else if(mid==nums.length-1)
                 if(nums[nums.length-1]<nums[nums.length-2])</pre>
                 {
                     a=nums.length-1;
                     break;
                 }
                 else
                 {
                     a=nums.length-2;
                     break;
                 }
             }
        }
        int res1=search(nums,0,a-1,target);
        int res2=search(nums,a,nums.length-1,target);
        return Math.max(res1,res2);
    }
}
```

# Search in Rotated Sorted Array II\*\*\*

02 April 2025 10:46

```
[1,1,1,1,1,1,1,1,1,1,1,1,1,2,1,1,1,1,1]
public boolean search(int[] nums, int target)
        int n=nums.length;
        int 1=0;
        int h=n-1;
        while(1<=h)</pre>
             int mid=(l+h)/2;
             if(nums[mid]==target)
                 return true;
             }
             if(nums[mid]==nums[1]&&nums[mid]==nums[h]) //Shrinking the cond
                 1++;
                 h--;
                 continue;
             if(nums[1]<=nums[mid])</pre>
                 if(nums[1]<=target&&target<=nums[mid])</pre>
                      h=mid-1;
                 }
                 else
                 {
                      l=mid+1;
                 }
             }
             else
             {
                 if(nums[mid]<=target&&target<=nums[h])</pre>
                 {
                      l=mid+1;
                 }
                 else
                      h=mid-1;
                 }
             }
        return false;
    }
```

```
class Solution {
public:
    int find(vector<int>nums)
        int n = nums.size();
        int pivot = 0;
        for(int i = 0 ; i < n-1 ; i++)</pre>
             // if(nums[i] == target)
            //
                    return true;
            if(nums[i+1] < nums[i])</pre>
             {
                 pivot = i+1;
                 return pivot;
             }
        }
        return 0;
    }
    int binary(vector<int>num,int l,int r,int k)
        while(l<=r)</pre>
        {
             int mid=(1+r)/2;
             if(num[mid]==k)
             {
                 return 1;
             }
            else if(num[mid]>k)
             {
                 r=mid-1;
             }
             else
             {
                 l=mid+1;
        return 0;
    }
    bool search(vector<int>& nums, int target)
        int 1=0;
        int r=nums.size()-1;
        int n=nums.size();
        if(nums[0]==target)
        {
             return true;
        }
        int mid=find(nums);
        return max(binary(nums,l,mid-1,target),binary(nums,mid,r,target));
    }
};
```

```
02 April 2025 12:56
```

```
class Solution {
    public int findMin(int[] nums)
         int a=0;
        int 1=0;
        int r=nums.length-1;
        if(nums.length==1||nums[1]<nums[r])</pre>
             return nums[0];
        }
        while(l<=r)</pre>
             int mid=(1+r)/2;
             if(mid>0&&mid<nums.length-1)</pre>
                 if(nums[mid]<nums[mid-1]&&nums[mid]<nums[mid+1])</pre>
                      a=mid;
                      break;
                 else if(nums[mid]>nums[0])
                      l=mid+1;
                 }
                 else
                 {
                      r=mid-1;
             else if(mid==0)
                 if(nums[0]>nums[1])
                      a=1;
                      break;
                 }
                 else
                 {
                      a=0;
                      break;
             else if(mid==nums.length-1)
                  if(nums[nums.length-1]<nums[nums.length-2])</pre>
                 {
                      a=nums.length-1;
                      break;
                  }
                 else
                  {
                      a=nums.length-2;
                      break;
                  }
             }
```

```
}
return nums[a];
}
```

```
02 April 2025 12:58
```

```
public int findKRotation(List<Integer> nums)
     int a=0;
     int I=0;
     int r=nums.size()-1;
     if(nums.size()==1||nums.get(I)<nums.get(r))</pre>
       return 0;
while(I<=r)
       int mid=(I+r)/2;
       if(mid>0&&mid<nums.size()-1)
          if(nums.get(mid)<nums.get(mid-1)&&nums.get(mid)<nums.get(mid+1))</pre>
          {
            a=mid;
            break;
          else if(nums.get(mid)>nums.get(0))
          {
            I=mid+1;
          }
          else
          {
            r=mid-1;
       else if(mid==0)
          if(nums.get(0)>nums.get(1))
            a=1;
            break;
          }
          else
            a=0;
            break;
          }
       else if(mid==nums.size()-1)
          if(nums.get(nums.size()-1)<nums.get(nums.size()-2))
          {
            a=nums.size()-1;
            break:
          else
            a=nums.size()-2;
            break;
     return a;
}
```

```
02 April 2025 12:59
```

```
public int singleNonDuplicate(int[] nums)
        int high = nums.length-1;
        int low = 0;
        int mid;
        //Boundary cases
        if(high==0)
            return nums[0];
        else if(nums[0]!=nums[1])
            return nums[0];
        else if(nums[high]!=nums[high-1])
            return nums[high];
        while(low<=high)</pre>
            mid = low + (high-low)/2;
            //Unique element condition
            if(nums[mid]!=nums[mid+1] && nums[mid]!=nums[mid-1])
                return nums[mid];
            if(((mid%2)==0 && nums[mid]==nums[mid+1])
               || ((mid\%2) == 1 \&\& nums[mid] == nums[mid-1]))
                low = mid+1;
            else
                high = mid-1;
        return -1;
    }
int singleNonDuplicate(vector<int>& nums)
    {
        int res=0;
        for(int i=0;i<nums.size();i++)</pre>
             res=res^nums[i];
        return res;
    }
```

```
02 April 2025 13:17
```

```
public int findPeakElement(int[] nums)
    {
        int a=0;
        int 1=0;
        int r=nums.length-1;
        if(nums.length==1)
             return 0;
        }
        while(l<=r)</pre>
        {
             int mid=(l+r)/2;
             if(mid>0&&mid<nums.length-1)</pre>
                 if(nums[mid]>nums[mid-1]&&nums[mid]>nums[mid+1])
                 {
                     a=mid;
                     break;
                 else if(nums[mid]>nums[mid-1])
                 {
                     l=mid+1;
                 }
                 else
                 {
                     r=mid-1;
            else if(mid==0)
                 if(nums[0]>nums[1])
                     a=0;
                     break;
                 }
                 else
                 {
                      a=1;
                     break;
                 }
            else if(mid==nums.length-1)
                 if(nums[nums.length-1]<nums[nums.length-2])</pre>
                 {
                      a=nums.length-2;
                     break;
                 }
                 else
                 {
                     a=nums.length-1;
                     break;
                 }
             }
        }
        return a;
    }
```

#### Find square root of a number in log n

```
02 April 2025 13:22
```

```
int floorSqrt(int n) {
    // Your code here
    return (int) Math.floor(Math.sqrt(n));
  }
MY SOLN in logn:
int floorSqrt(int n) {
    // Your code here
    int low = 0;
    int high = n;
    int ans = -1;
    while (low<=high){
      int mid = low+(high-low)/2;
      int midSq = mid*mid;
      if (midSq==n){
         return mid;
      } else if (midSq < n) {
        low = mid+1;
         ans = mid;
      }else{
         high = mid-1;
      }
    }
    return ans;
  }
```

```
public int find(int n,int m,int mid)
    long ans=1;
    for(int i=0;i<n;i++)
      ans=ans*mid;
      if(ans>m)
         return 2;
      }
    }
    if(ans==m)
      return 1;
    return 0;
  public int nthRoot(int n, int m)
    int l=1;
    int r=m;
    while(I<=r)
      int mid=(l+r)/2;
      int ans=find(n,m,mid);
      if(ans==1)
         return mid;
      else if(ans==0)
         I=mid+1;
      }
      else
         r=mid-1;
    }
    return -1;
```

```
public int find(int[]piles, int x)
         int a=0;
        for(int i=0;i<piles.length;i++)</pre>
             a+=Math.ceil((double)(piles[i])/(double)(x));
         }
        return a;
    }
    public int minEatingSpeed(int[] piles, int h)
         int a=1;
        int b=1;
        for(int i=0;i<piles.length;i++)</pre>
             a=Math.min(a,piles[i]);
             b=Math.max(b,piles[i]);
         }
        while(a<=b)</pre>
             int mid=(a+b)/2;
             int ans=find(piles,mid);
             if(ans<=h)</pre>
             {
                 b=mid-1; //ye kyuki min find karna hai hame
             }
             else
             {
                 a=mid+1;
        return a;
    }
```

```
13:23
```

```
public int find(int[]piles, int x ,int k)
        int a=0;
        int maxc=0;
        for(int i=0;i<piles.length;i++)</pre>
            if(piles[i]<=x)</pre>
            {
                 a++;
                 if(a==k)
                 {
                     maxc++;
                     a=0;
            }
            else
            {
                 a=0;
        }
        return maxc;
    }
    public int minDays(int[] bloomDay, int m, int k)
        long val = (long) m * k;
        int n = bloomDay.length; // Size of the array
        if (val > n) return -1;
        int a = Integer.MAX_VALUE; // Minimum day
        int b = Integer.MIN_VALUE; // Maximum day
        for(int i=0;i<bloomDay.length;i++)</pre>
            a=Math.min(a,bloomDay[i]);
            b=Math.max(b,bloomDay[i]);
        }
        while(a<=b)</pre>
        {
            int mid=(a+b)/2;
            int ans=find(bloomDay,mid,k);
            if(ans>=m)
            {
                 b=mid-1; //ye kyuki min find karna hai hame
            }
            else
             {
                 a=mid+1;
        return a;
    }
```

```
#include <iostream>
                                                         // Online C++ compiler to run C++ program online
                                                         #include <iostream>
struct comp{
  int a=10;
                                                         #include<cstring>
  char b;
  float c;
                                                         int main() {
  //double t;
                                                           // Write C++ code here
  int arr[0]; //
                                                           int a=0;
  static int var;
                                                            char arr[10];
};
int main() {
                                                            std::cin>>arr;
                                                            if(strncmp(arr,"passwd",6)==0)
  // Write C++ code here
  std::cout << sizeof(comp)<<" ";
                                                            {
  comp cp;
                                                              a=1;
  std::cout<<cp.a<<" ";
                                                            }
  std::cout<<sizeof(cp)<<" ";
                                                           if(a)
                                                              std::cout<<"access granted";</pre>
  return 0;
}
                                                            }
                                                            else
                                                              std::cout<<"access denied";
                                                           return 0;
                                                         }
```

```
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```

```
public int find(int[]piles, int x)
    {
        int maxc=0;
        for(int i=0;i<piles.length;i++)</pre>
            maxc+=Math.ceil((double)piles[i]/(double)(x));
        //System.out.println(maxc);
        return maxc;
   public int smallestDivisor(int[] nums, int threshold)
        //long val = (long) m * k;
        int n = nums.length; // Size of the array
        //if (val > n) return -1;
        int ans=-1;
        int a = 1;//Integer.MAX_VALUE; // initialization with 1
        int b = Integer.MIN_VALUE; // Maximum day
        for(int i=0;i<nums.length;i++)</pre>
            a=Math.min(a,nums[i]);
            b=Math.max(b,nums[i]);
        }
        while(a<=b)</pre>
        {
            int mid=(a+b)/2;
            int ans1=find(nums,mid);
            //System.out.println(ans1);
            if(ans1==threshold)
                ans=mid;
                b=mid-1; //threshold hai ya usse kam to badhane ke liye denominator
ekam karna padega na re baba
            }
            else if(ans1>threshold)
                a=mid+1;
            }
            else
            {
                ans=mid;
                b=mid-1;
            }
        return ans;
    }
```

#### **Conclusion:**

By initializing a to 1, we ensure that we are considering **all possible divisors**, from the smallest (which produces the largest sum) to the largest (which will produce the smallest sum). Starting with the minimum element in nums would skip potential valid solutions and fail to find the correct smallest divisor.

```
public int find(int[]piles, int x)
   {
       int a=0;
       int maxc=1;
       for(int i=0;i<piles.length;i++)</pre>
            if(a+piles[i]>x)
                maxc++;
                a=piles[i];
            }
            else
            {
                a+=piles[i];
       }
       return maxc;
   }
   public int shipWithinDays(int[] weights, int days)
       //long val = (long) m * k;
       int n = weights.length; // Size of the array
       //if (val > n) return -1;
         int a = 0; // Minimum possible capacity is the largest weight in the array
         int b = 0; // Maximum possible capacity is the sum of all weights
       int res=-1;
       for(int i=0;i<weights.length;i++)</pre>
           a=Math.max(a,weights[i]);
            b+=weights[i];
       }
       while(a<=b)</pre>
            int mid=(a+b)/2;
            int ans=find(weights,mid);
            if(ans>days)
            {
                a=mid+1; //ye kyuki min find karna hai hame
            }
           else
            {
                res=mid;
                b=mid-1;
            }
       }
       return res;
   }
```

# Kth Missing Positive Number

02 April 2025

13:23

#### **Aggressive Cows**

02 April 2025 13:23

```
public static boolean canWePlace(int[] stalls, int dist, int cows) {
    int n = stalls.length; //size of array
    int cntCows = 1; //no. of cows placed
    int last = stalls[0]; //position of last placed cow.
    for (int i = 1; i < n; i++) {
       if (stalls[i] - last >= dist) {
         cntCows++; //place next cow.
         last = stalls[i]; //update the last location.
       if (cntCows >= cows) return true;
    }
    return false;
  public static int aggressiveCows(int[] stalls, int k) {
    int n = stalls.length; //size of array
    //sort the stalls[]:
    Arrays.sort(stalls);
    int low = 1, high = stalls[n - 1] - stalls[0];
    //apply binary search:
    while (low <= high) {
       int mid = (low + high) / 2;
       if (canWePlace(stalls, mid, k) == true) {
         low = mid + 1;
       } else high = mid - 1;
    }
    return high;
```

# Split array - Largest Sum

02 April 2025 13:23

#### Painter's partition

02 April 2025 13:2

```
public static int countStudents(ArrayList<Integer> arr, int pages) {
   int n = arr.size(); // size of array
   int students = 1;
   long pagesStudent = 0;
   for (int i = 0; i < n; i++) {
      if (pagesStudent + arr.get(i) <= pages) {</pre>
        // add pages to current student
        pagesStudent += arr.get(i);
      } else {
        // add pages to next student
        students++;
        pagesStudent = arr.get(i);
   return students;
 public static int findPages(ArrayList<Integer> arr, int n, int m) {
   // book allocation impossible
   if (m > n)
      return -1;
   int low = Collections.max(arr);
   int high = arr.stream().mapToInt(Integer::intValue).sum();
   while (low <= high) {
      int mid = (low + high) / 2;
      int students = countStudents(arr, mid);
      if (students > m) {
        low = mid + 1;
      } else {
        high = mid - 1;
   return low;
```

0jlnbr

# Minimize Max Distance to Gas Station

02 April 2025 13:23

# Median of 2 sorted arrays

02 April 2025

13:24

#### **Book Allocation Problem**

02 April 2025 13:23

```
public static int countStudents(ArrayList<Integer> arr, int pages) {
int n = arr.size(); // size of array
int students = 1;
long pagesStudent = 0;
for (int i = 0; i < n; i++) {
if (pagesStudent + arr.get(i) <= pages) {</pre>
// add pages to current student
pagesStudent += arr.get(i);
} else {
// add pages to next student
students++;
pagesStudent = arr.get(i);
}
return students;
}
public static int findPages(ArrayList<Integer> arr, int n, int m) {
// book allocation impossible
if (m > n)
return -1;
int low = Collections.max(arr);
int high = arr.stream().mapToInt(Integer::intValue).sum();
while (low <= high) {
int mid = (low + high) / 2;
int students = countStudents(arr, mid);
if (students > m) {
low = mid + 1;
} else {
high = mid - 1;
}
return low;
```

# Kth element of 2 sorted arrays

02 April 2025

13:24

#### Find the row with maximum number of 1's

```
11 April 2025 01:25
```

```
public static int lowerBound(ArrayList<Integer> arr, int n, int x) {
    int low = 0, high = n - 1;
    int ans = n;
    while (low <= high) {
      int mid = (low + high) / 2;
      // maybe an answer
      if (arr.get(mid) >= x) {
         ans = mid;
         // look for smaller index on the left
         high = mid - 1;
      } else {
         low = mid + 1; // look on the right
      }
    }
    return ans;
  public static int rowWithMax1s(ArrayList<ArrayList<Integer>> matrix, int n, int m) {
    int cnt_max = 0;
    int index = -1;
    // traverse the rows:
    for (int i = 0; i < n; i++) {
      // get the number of 1's:
      int cnt_ones = m - lowerBound(matrix.get(i), m, 1);
      if (cnt_ones > cnt_max) {
         cnt_max = cnt_ones;
         index = i;
      }
    return index;
```

## Search in a 2 D matrix

```
11 April 2025 01:26
```

```
public boolean searchMatrix(int[][] matrix, int target)
{
    int i=0;
    int j=matrix[0].length-1;
    while(i<=matrix.length-1&&j>=0)
    {
        if(matrix[i][j]==target)
        {
            return true;
        }
        else if(matrix[i][j]>target)
        {
                j--;
        }
        else
        {
                i++;
        }
        }
        return false;
}
```

### Search in a row and column wise sorted matrix

```
11 April 2025 01:26
```

```
public boolean searchMatrix(int[][] matrix, int target)
{
    int i=0;
    int j=matrix[0].length-1;
    while(i<=matrix.length-1&&j>=0)
    {
        if(matrix[i][j]==target)
          {
            return true;
        }
        else if(matrix[i][j]>target)
        {
                j--;
        }
        else
        {
                i++;
        }
        }
        return false;
```

# Find Peak Element (2D Matrix)

11 April 2025 01:26

### Matrix Median

11 April 2025

01:26