EXPERIMENT-4

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Semester: 6th **Subject Code:** 22ITP-351

PROBLEM-1

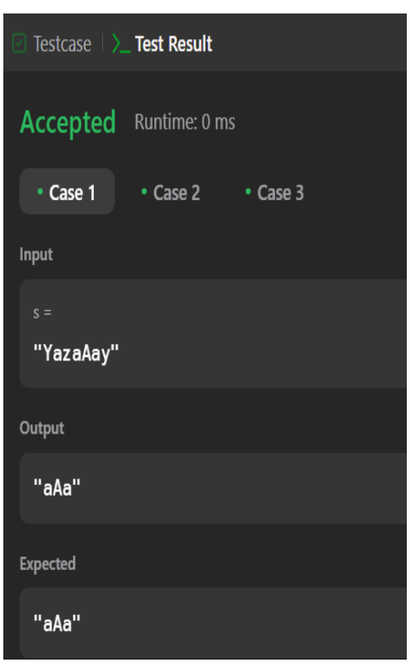
AIM:-

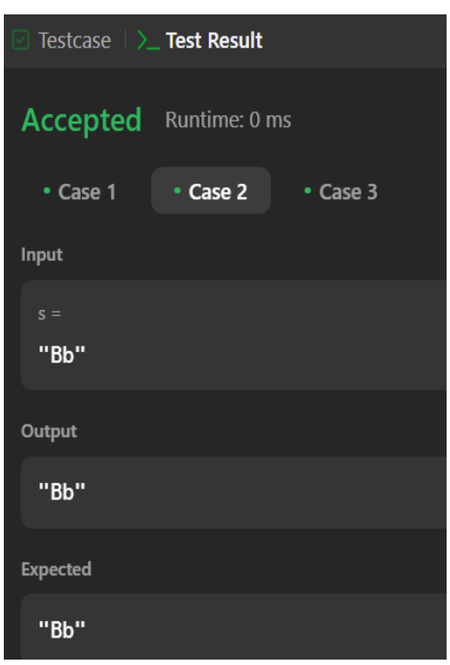
Longest Nice Substring

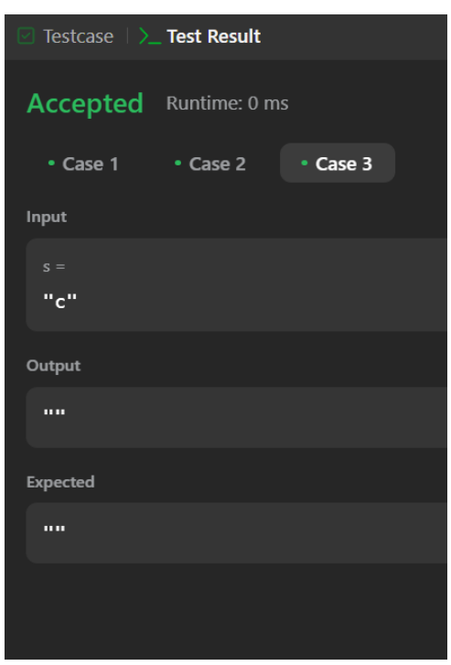
CODE:-

```
class Solution {
    public String longestNiceSubstring(String s) {
        Set<Character> charSet = new HashSet<>();
        for (int i = 0; i < s.length(); i++) {
            charSet.add(s.charAt(i));
        }
        for (int i = 0; i < s.length(); i++) {
            if (charSet.contains(Character.toUpperCase(s.charAt(i))) &&
                    charSet.contains(Character.toLowerCase(s.charAt(i)))) {
                continue;
            }
            String s1 = longestNiceSubstring(s.substring(0, i));
            String s2 = longestNiceSubstring(s.substring(i+1));
            return s1.length()>= s2.length() ? s1 : s2;
        }
        return s;
    }
}
```

OUTPUT:-







PROBLEM-2

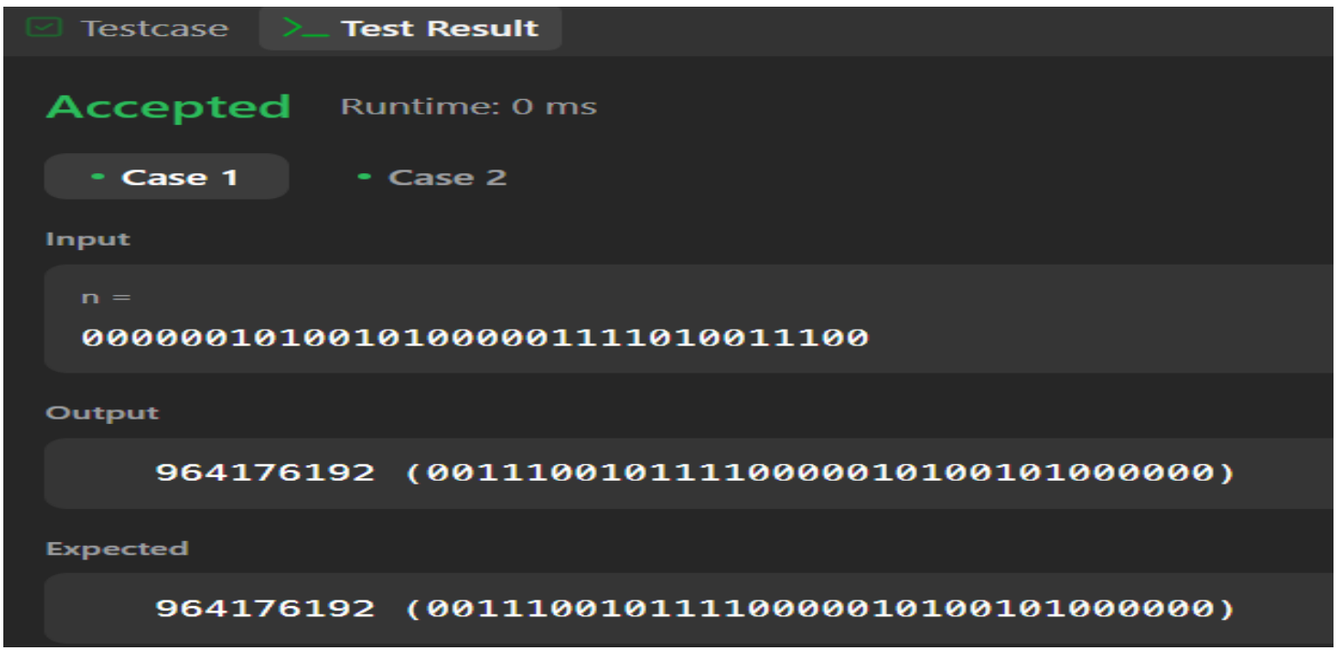
AIM:-

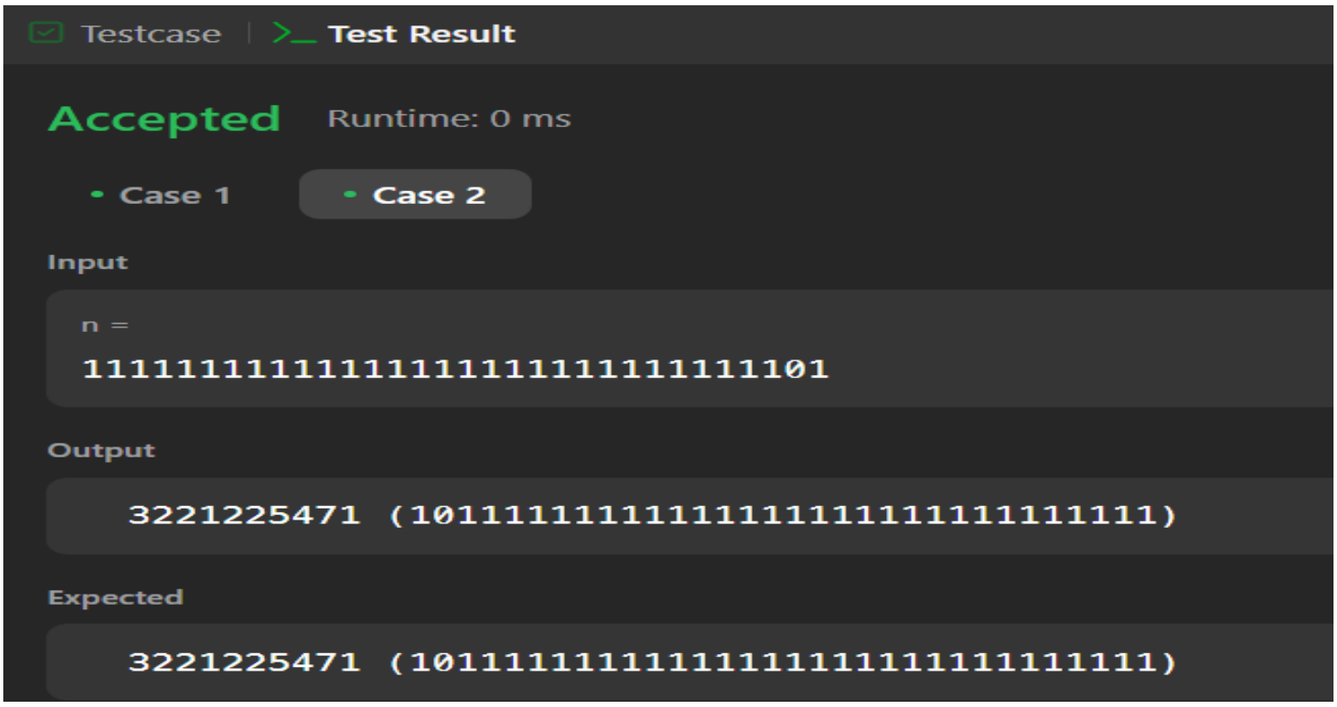
Reverse Bits

CODE:-

```
public class Solution {
    public int reverseBits(int n) {
        int ans = 0;
        for (int i = 0; i < 32; i++) {
            ans <<= 1;
            ans |= (n & 1);
            n >>= 1;
        }
        return ans;
    }
}
```

OUTPUT:





PROBLEM-3

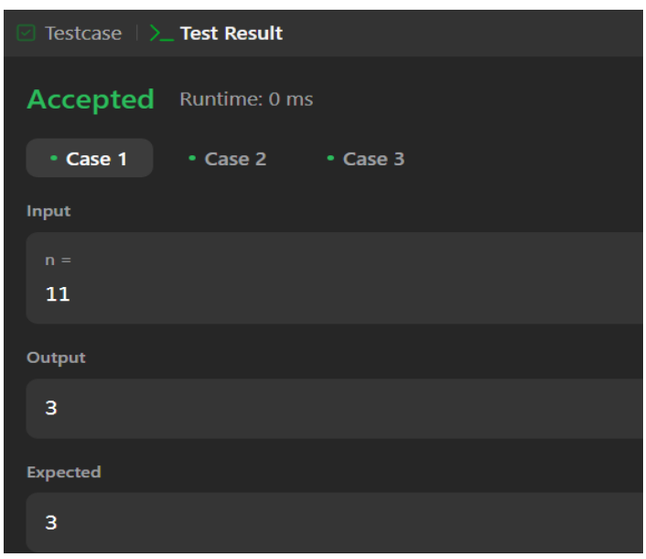
AIM:-

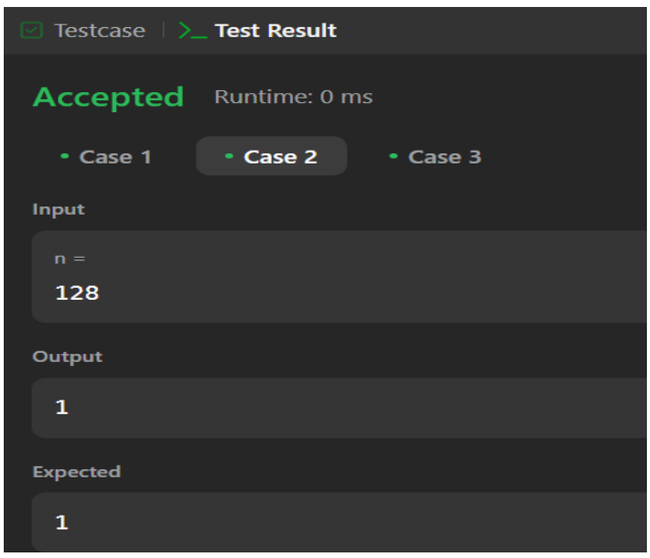
Number of 1 bits

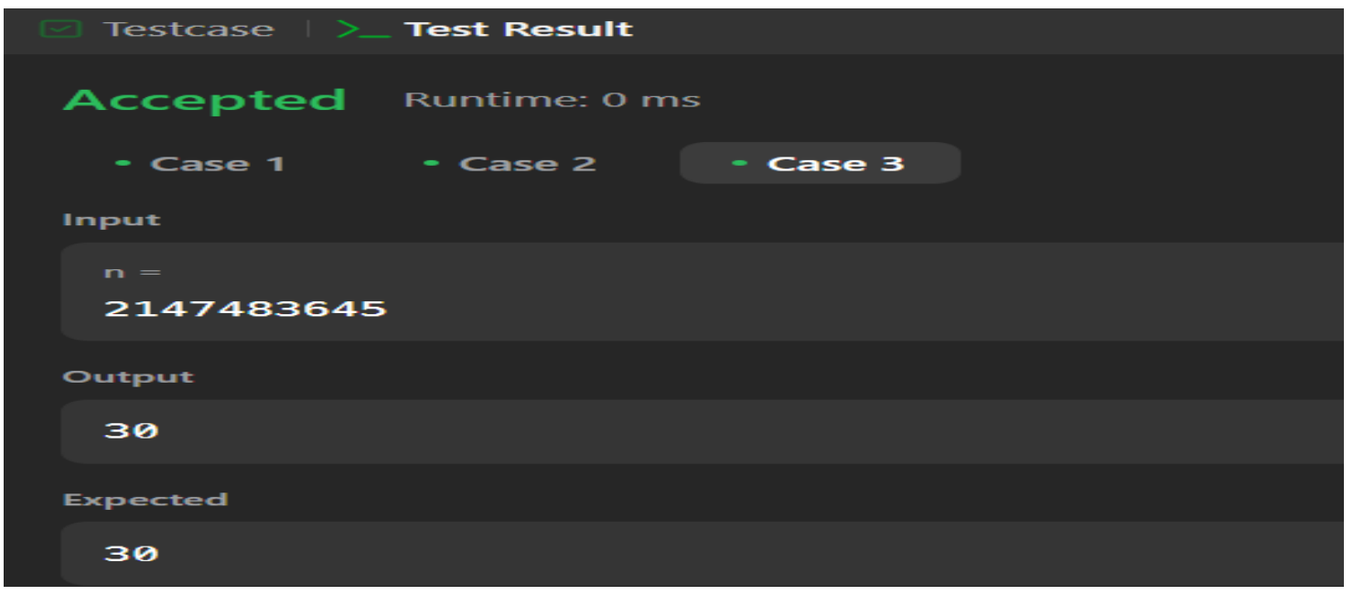
CODE:-

```
class Solution {
    public int hammingWeight(int n) {
        String Binary_no=Integer.toBinaryString(n);
        return count(Binary_no,'1');
    }
    public int count(String str,char value){
        int count=0;
        for (int i=0;i<str.length();i++){
            char a=str.charAt(i);
            if (a==value){
                count++;
            }
        }
        return count;
    }
}
```

OUTPUT:-







PROBLEM-4

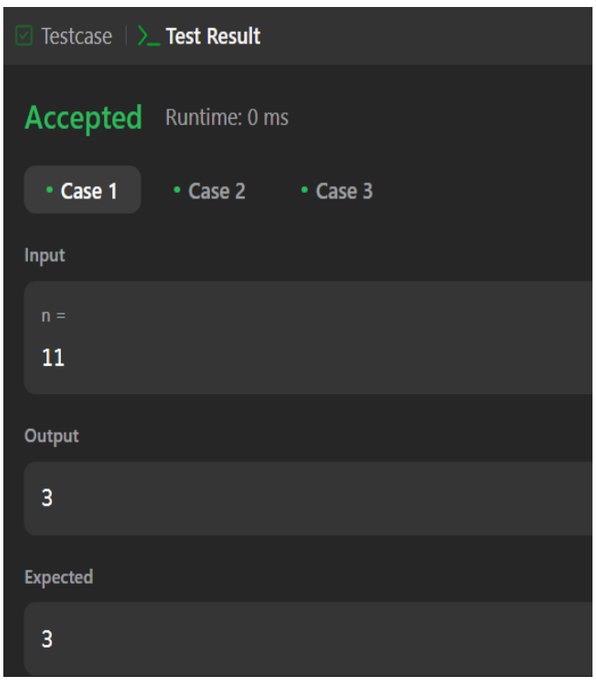
AIM:-

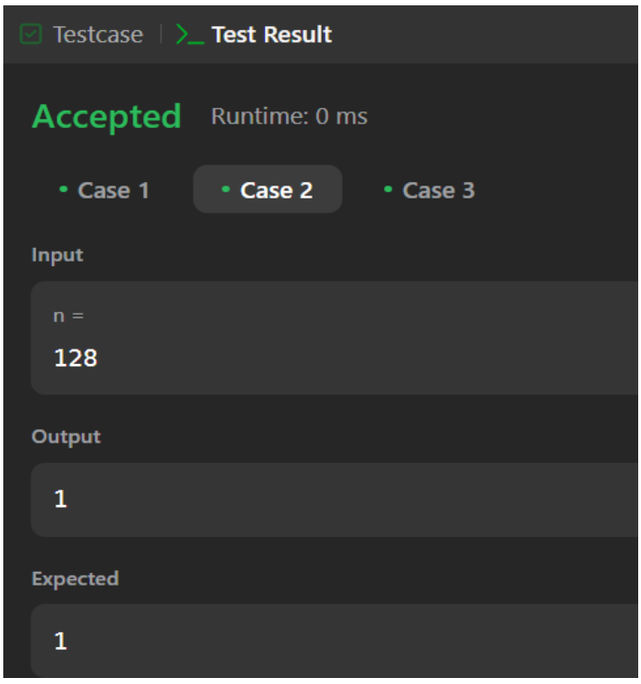
Max Subarray

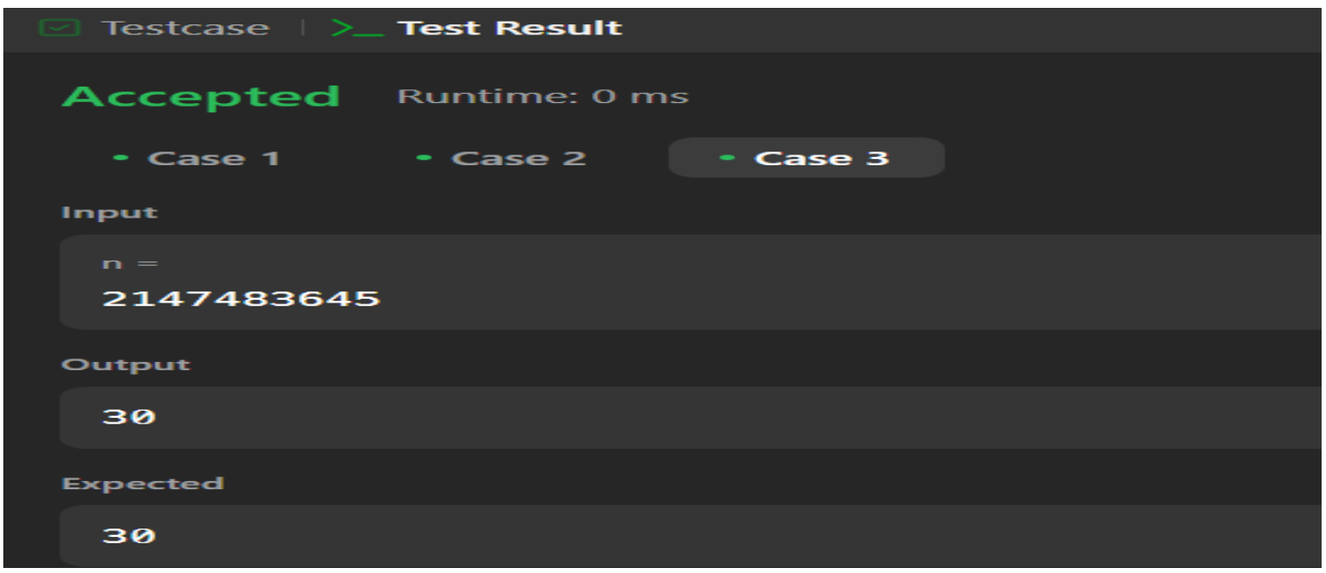
CODE:-

```
class Solution {
    public int maxSubArray(int[] nums) {
        int maxSum = nums[0];
        int currentSum = nums[0];

        for (int i = 1; i < nums.length; i++) {
            currentSum = Math.max(nums[i], currentSum + nums[i]);
            maxSum = Math.max(maxSum, currentSum);
        }

        return maxSum;
    }
}
```

OUTPUT:-







PROBLEM-5

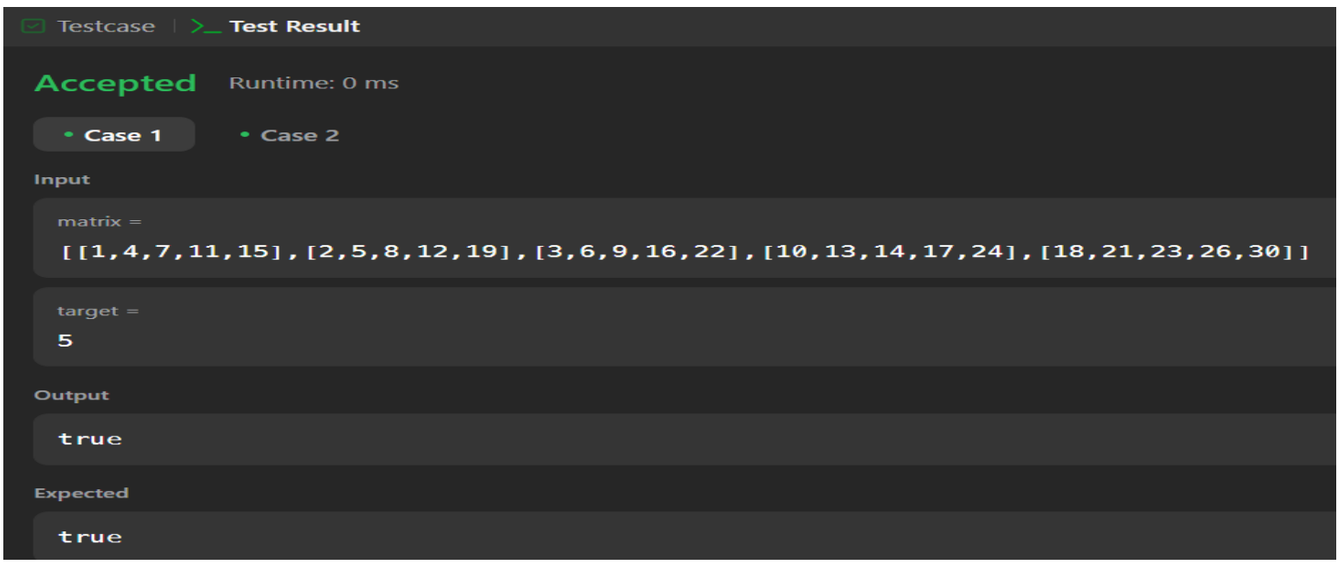
AIM:-

Search 2d matrix 2

CODE:-

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

OUTPUT:-



PROBLEM-6

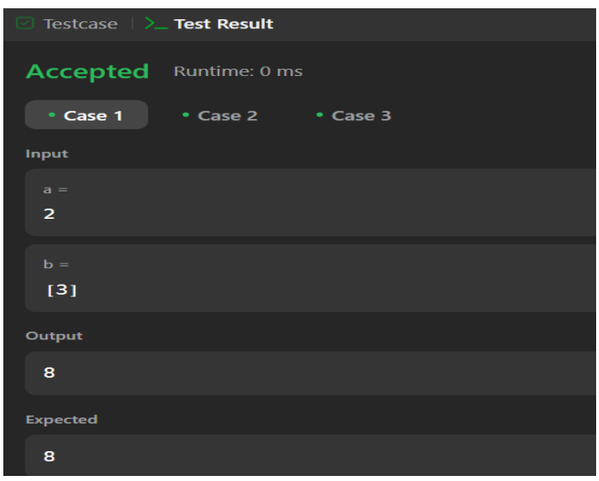
AIM:-

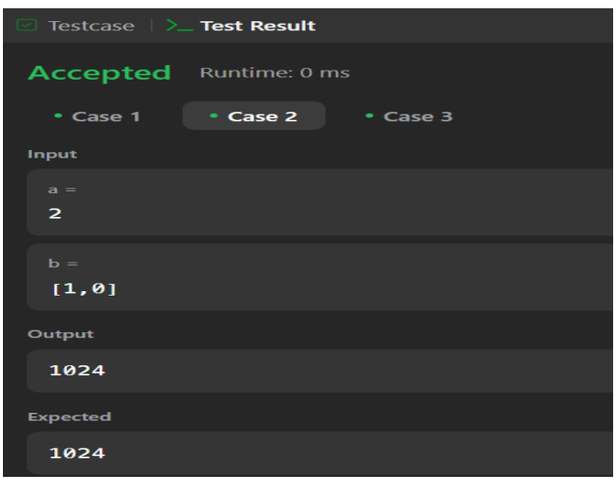
Super Pow

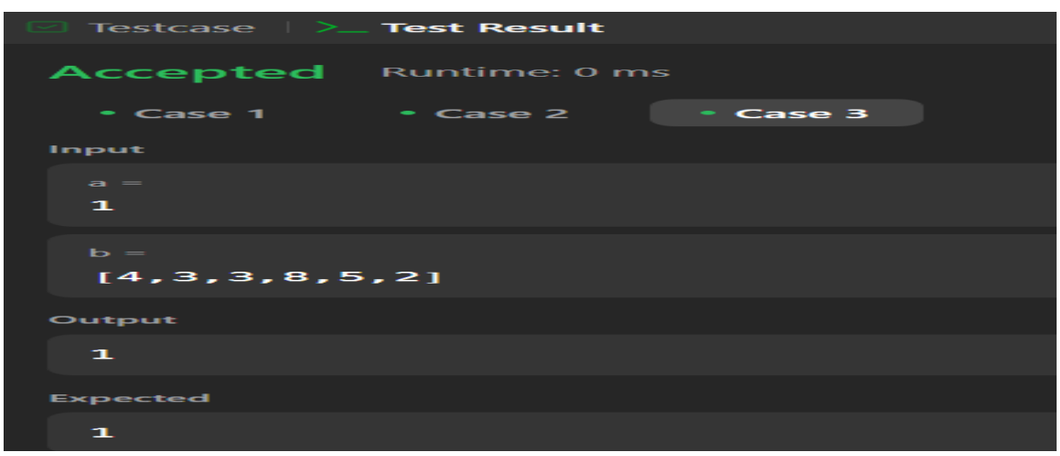
CODE:-

```
class Solution {
    public int superPow(int a, int[] b) {
        int num=0;
        for(int i:b){
            num=(num*10+i)%1140;
        }
        return binexpo(a,num,1337);
    }
    public int binexpo(int a, int b, int m){
        a%=m;
        int res=1;
        while(b>0){
            if((b&1)==1)
                res=(res*a)%m;
            a=(a*a)%m;
            b>>=1;
        }
        return res;
    }
}
```

OUTPUT:-







PROBLEM-7

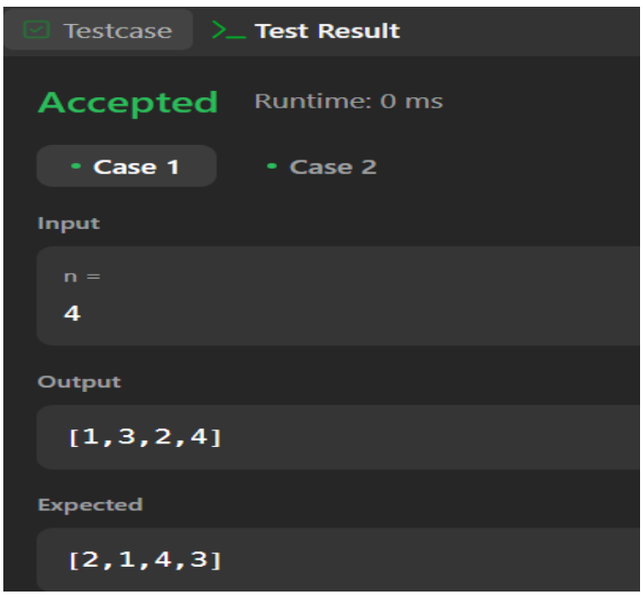
AIM:-

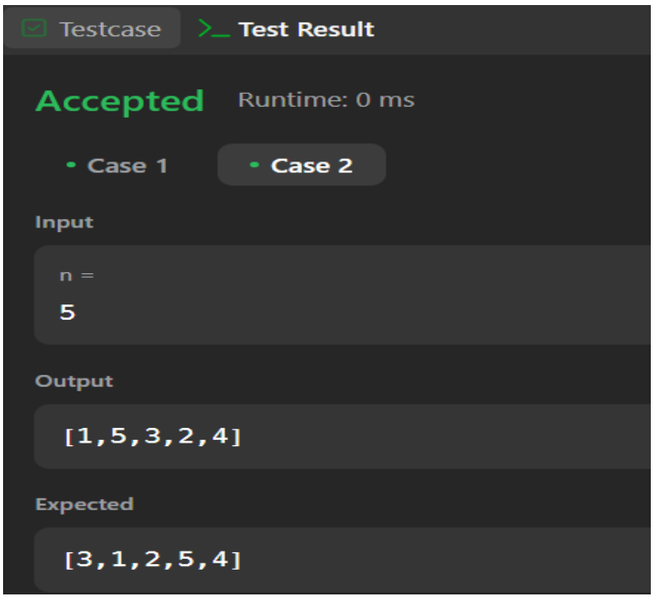
Beautiful Array

CODE:-

```
class Solution {
    public int[] beautifulArray(int n) {
        int[] ans = new int[n];
        for(int i = 0; i  < n; i++){
            ans[i] = i+1;
        }
        recursion(ans, 0, n-1);
        return ans;
    }
    public void recursion(int[] arr, int left, int right){
        if(left >= right)
            return;
        ArrayList<Integer> l = new ArrayList<>();
        ArrayList<Integer> r = new ArrayList<>();
        boolean alt = true;
        for(int i = left; i <= right; i++){
            if(alt)
                l.add(arr[i]);
            else
                r.add(arr[i]);
            alt = !alt;
        }
        for(int i = left; i <= right; i++){
            if(!l.isEmpty())
                arr[i] = l.remove(0);
            else
                arr[i] = r.remove(0);
        }
        recursion(arr, left, (right+left)/2);
        recursion(arr, (left+right)/2+1, right);
    }
}
```

OUTPUT:-





PROBLEM-8

AIM:-

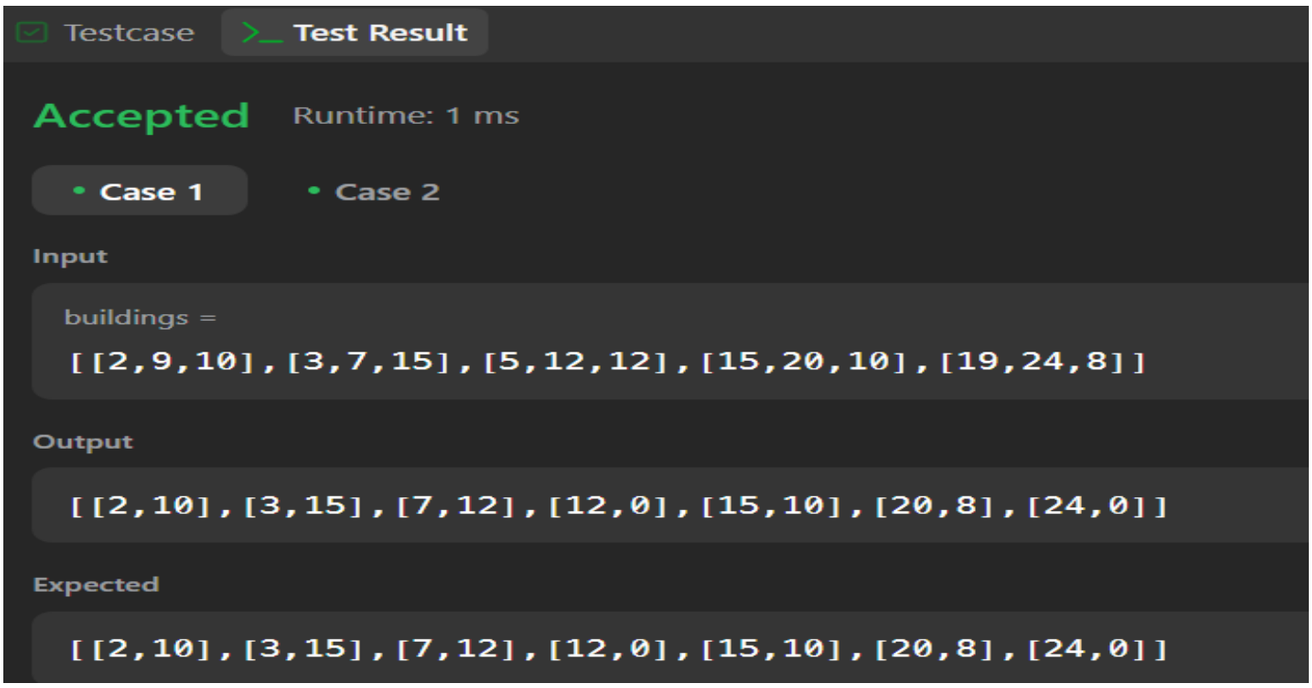
The Skyline Problem

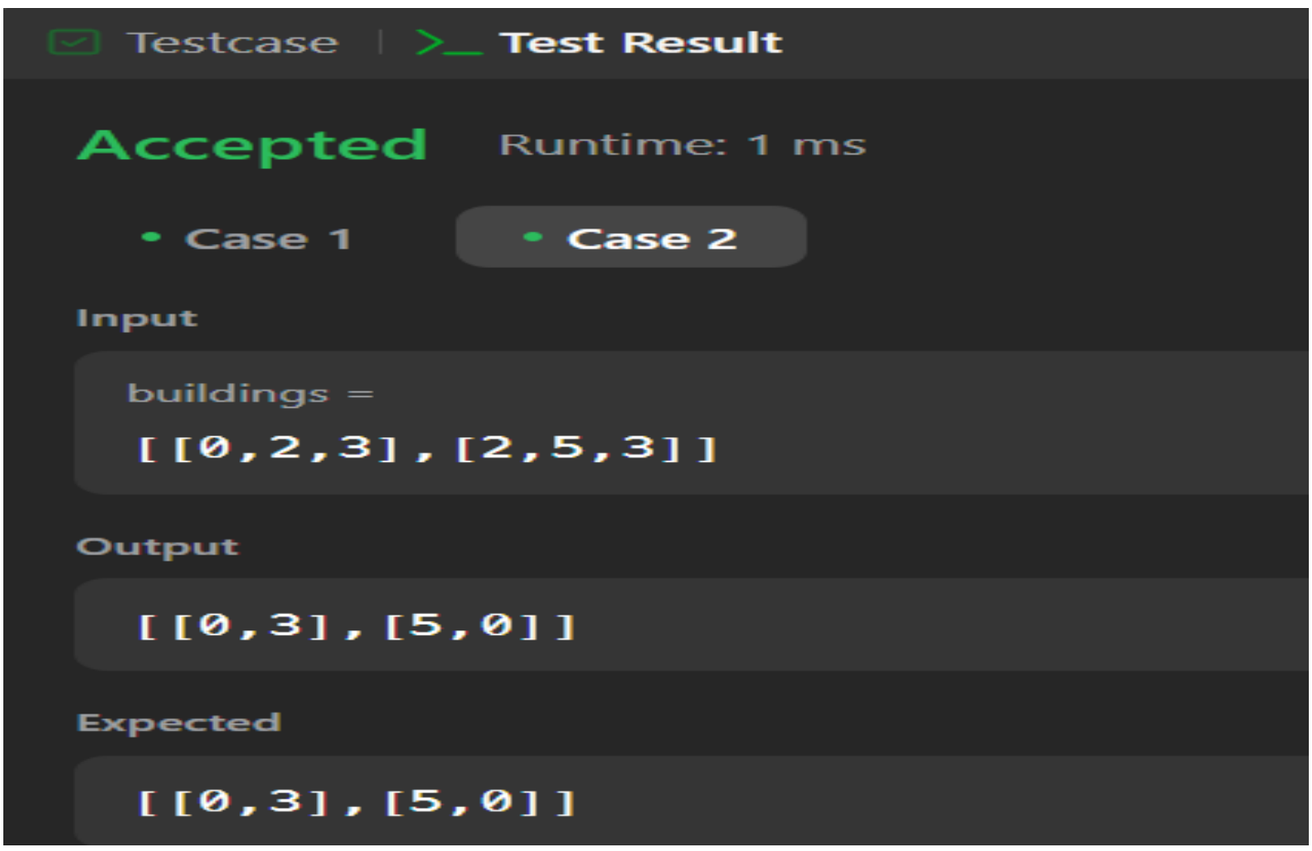
CODE:-

```
class Solution {
    public class Pair{
        int x,height;
        Pair(int x,int height){
            this.x = x;
            this.height = height;
        }
    }
    class SortbyPoints implements Comparator<Pair>{
        public int compare(Pair a, Pair b){
            if(a.x == b.x) return a.height - b.height;
            return a.x-b.x;
        }
    }
    public List<List<Integer>> getSkyline(int[][] buildings) {
        List<List<Integer>> res = new ArrayList<>();
        List<Pair> list = new ArrayList<>();
        for(int[] arr:buildings){
            list.add(new Pair(arr[0],-arr[2]));
            list.add(new Pair(arr[1],arr[2]));
        }
        Collections.sort(list,new SortbyPoints());
        PriorityQueue<Integer> q = new PriorityQueue<>(Collections.reverseOrder());
        int cur = 0;
        q.add(cur);
```

```
            for(int i=0;i<list.size();i++){
                int pos = list.get(i).x,h = list.get(i).height;
                if(h < 0) q.add(-h);
                else q.remove(h);

                if(cur != q.peek()){
                    res.add(Arrays.asList(pos,q.peek()));
                    cur = q.peek();
                }
            }
            return res;
        }
    }
```

OUTPUT:-





PROBLEM-9

AIM:-

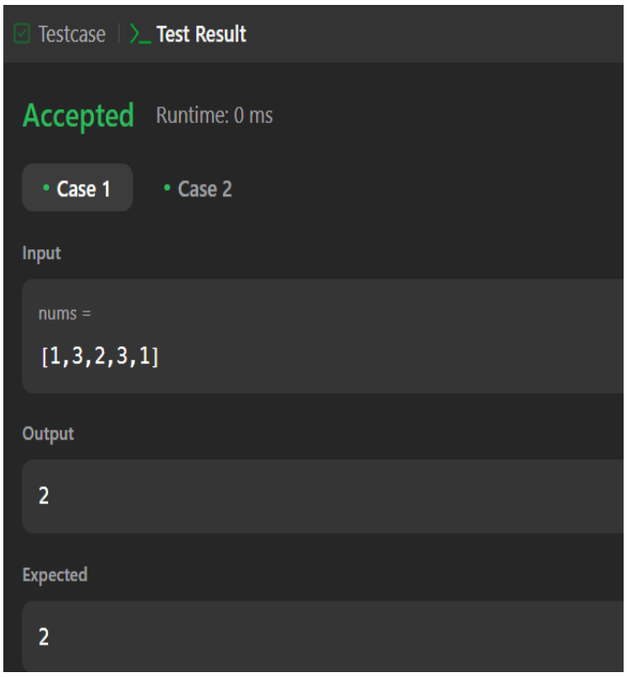
Reverse Pairs

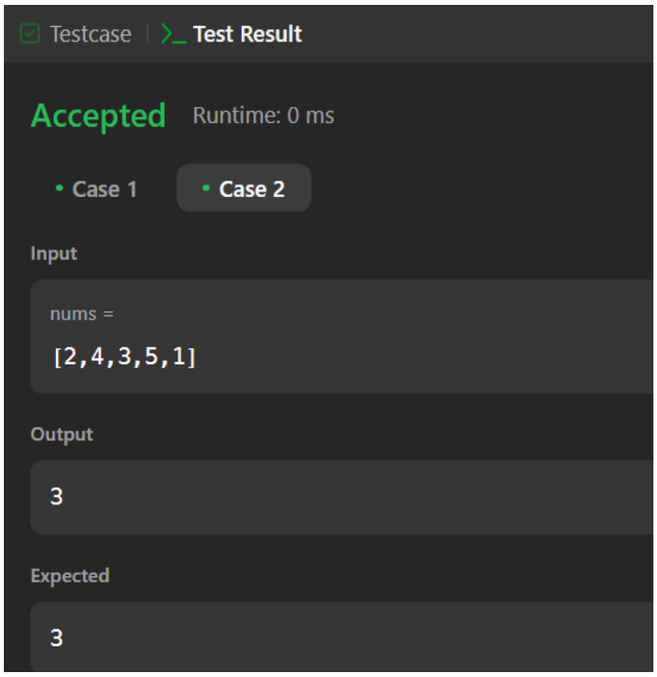
CODE:-

```
class Solution {
    static int count;
    public static void sortMerge(int[] arr){
        int n=arr.length;
        if (n<=1) return ;
        int[] rightSortArray=new int[n/2];
        int[] leftSortArray=new int[n-n/2];
        int x=0;
        for (int i = 0; i < rightSortArray.length; i++) {
            rightSortArray[i]=arr[x];
            x++;
        }
        for (int i = 0; i < leftSortArray.length; i++) {
            leftSortArray[i]=arr[x];
            x++;
        }
        sortMerge(rightSortArray);
        sortMerge(leftSortArray);
        int a=0,b=0;
        while (a<rightSortArray.length && b<leftSortArray.length) {
            if ((long)rightSortArray[a]>2*(long)leftSortArray[b]){
                count+=rightSortArray.length-a;
                b++;
            }else a++;
        }
        int i=0,j=0,k=0;
        while (i<rightSortArray.length && j<leftSortArray.length) {
            if (rightSortArray[i]<leftSortArray[j]) {
                arr[k]=rightSortArray[i];
                i++;
            }else if (rightSortArray[i]>leftSortArray[j]) {
                arr[k]=leftSortArray[j];
                j++;
            }else{
                arr[k]=rightSortArray[i];
                i++;
                k++;
                arr[k]=leftSortArray[j];
```

```
                j++;
            }
            k++;
        }
        if (i==rightSortArray.length) {
            while(j<leftSortArray.length){
                arr[k]=leftSortArray[j];
                j++;
                k++;
            }
        }
        if (j==leftSortArray.length) {
            while(i<rightSortArray.length){
                arr[k]=rightSortArray[i];
                k++;
                i++;
            }
        }
        rightSortArray=null;
        leftSortArray=null;

    }
    public int reversePairs(int[] nums) {
        count=0;
        sortMerge(nums);
        return count;
    }
}
```

OUTPUT:-





PROBLEM-10

AIM:-

Longest increasing subsequence 2

CODE:-

```
class Solution {
    public int lengthOfLIS(int[] nums, int k) {
        int[] temp = new int[nums.length];
        int ans = 1;
        Arrays.fill(temp, 1);
        for(int i = 1; i < nums.length; i++) {
            for(int j = 0; j < i; j++) {
                if(nums[i] > nums[j] && nums[i] - nums[j] <= k) {
                    temp[i] = Math.max(temp[i], temp[j] + 1);
                    ans = Math.max(temp[i], ans);
                }
            }
        }
        return ans;
    }
}
```

OUTPUT:-