Problem 1

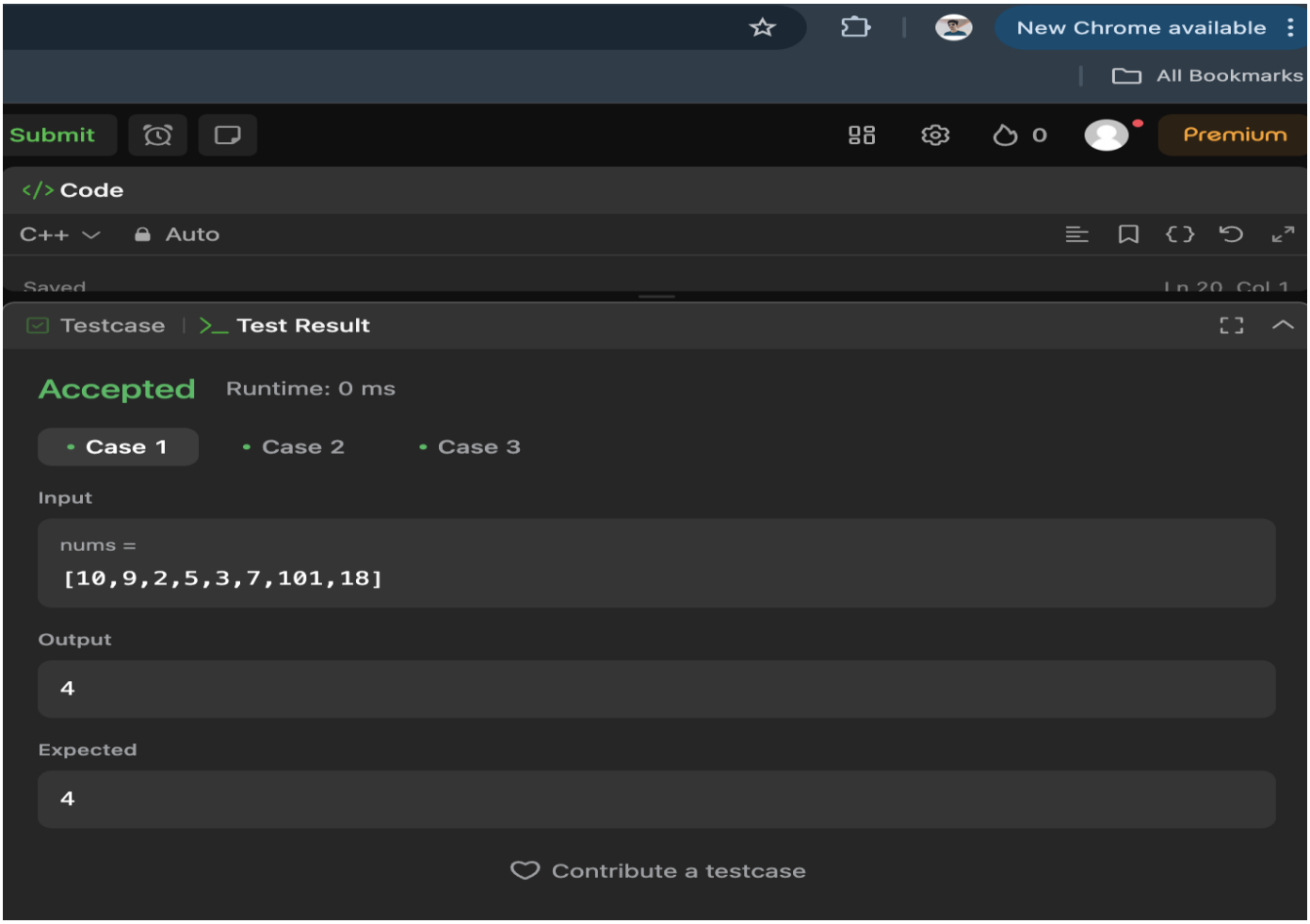
Aim:

The Longest Increasing Subsequence

Code:

```
import java.io.*;
import java.util.*;

class Result {

    public static int longestIncreasingSubsequence(List<Integer> arr) {
        if (arr == null || arr.isEmpty()) return 0;

        List<Integer> sub = new ArrayList<>();

        for (int num : arr) {
            int idx = Collections.binarySearch(sub, num);
            if (idx < 0) idx = -(idx + 1);  // Convert negative index to insertion point

            if (idx < sub.size()) {
                sub.set(idx, num);  // Replace element at found position
            } else {
                sub.add(num);  // Append new element to extend LIS
            }
        }

        return sub.size();
    }
}

public class Solution {
    public static void main(String[] args) throws IOException {
        BufferedReader bufferedReader = new BufferedReader(new InputStreamReader(System.in));
        BufferedWriter bufferedWriter = new BufferedWriter(new
FileWriter(System.getenv("OUTPUT_PATH")));

        int n = Integer.parseInt(bufferedReader.readLine().trim());

        List<Integer> arr = new ArrayList<>();

        for (int i = 0; i < n; i++) {
            int arrItem = Integer.parseInt(bufferedReader.readLine().trim());
            arr.add(arrItem);
        }

        int result = Result.longestIncreasingSubsequence(arr);

        bufferedWriter.write(String.valueOf(result));
        bufferedWriter.newLine();

        bufferedReader.close();
        bufferedWriter.close();
    }
}
```

Output:


New Chrome available
All Bookmarks
Submit
0
Premium
Code
C++
Auto
Saved
Ln 20, Col 1
Testcase
Test Result
Accepted
Runtime: 0 ms
Case 1
Case 2
Case 3
Input
nums =
[10,9,2,5,3,7,101,18]
Output
4
Expected
4
Contribute a testcase

Problem 2

Aim:

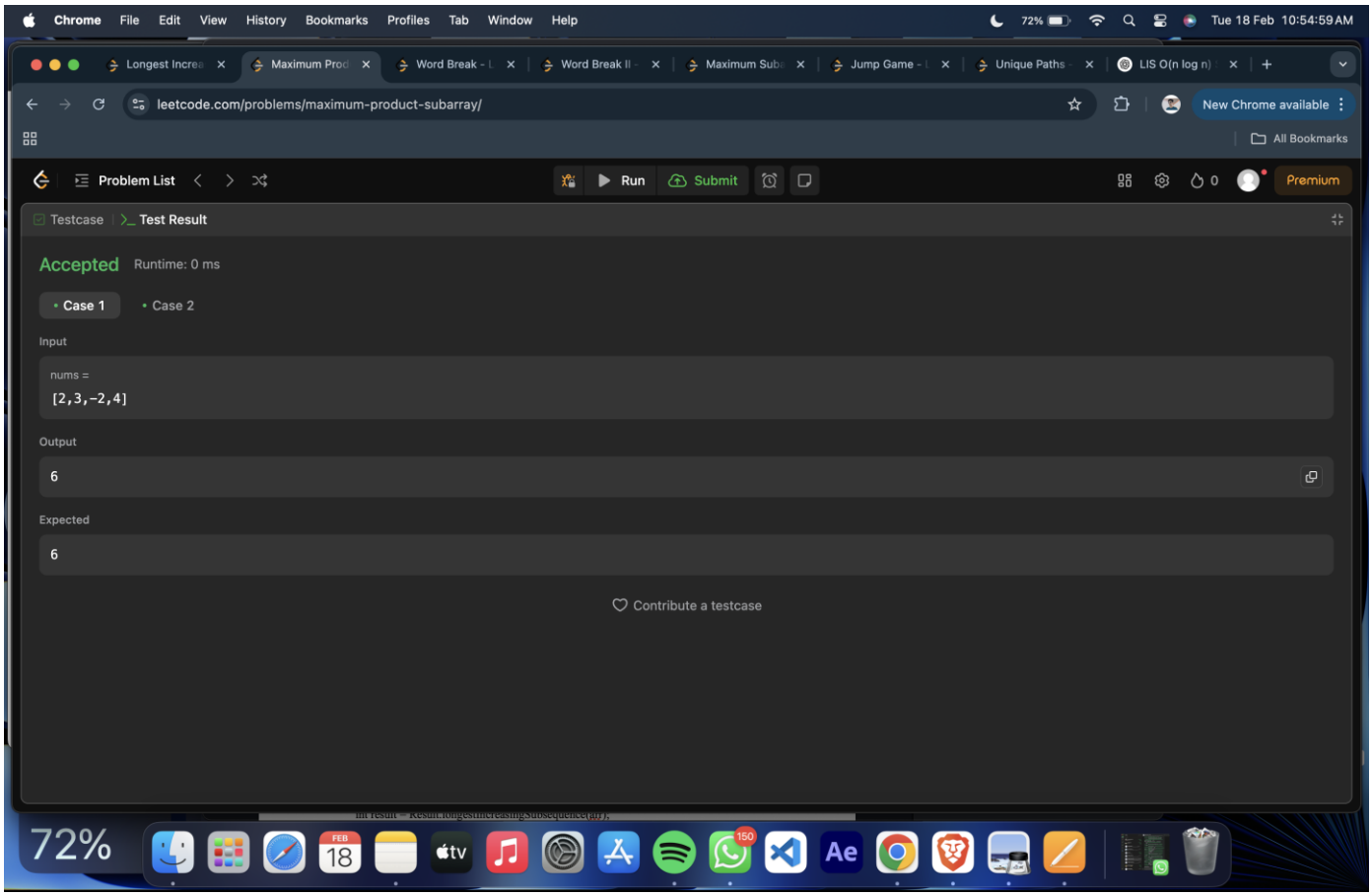
Maximum Product Subarray

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:

Test Case 1



Problem 3

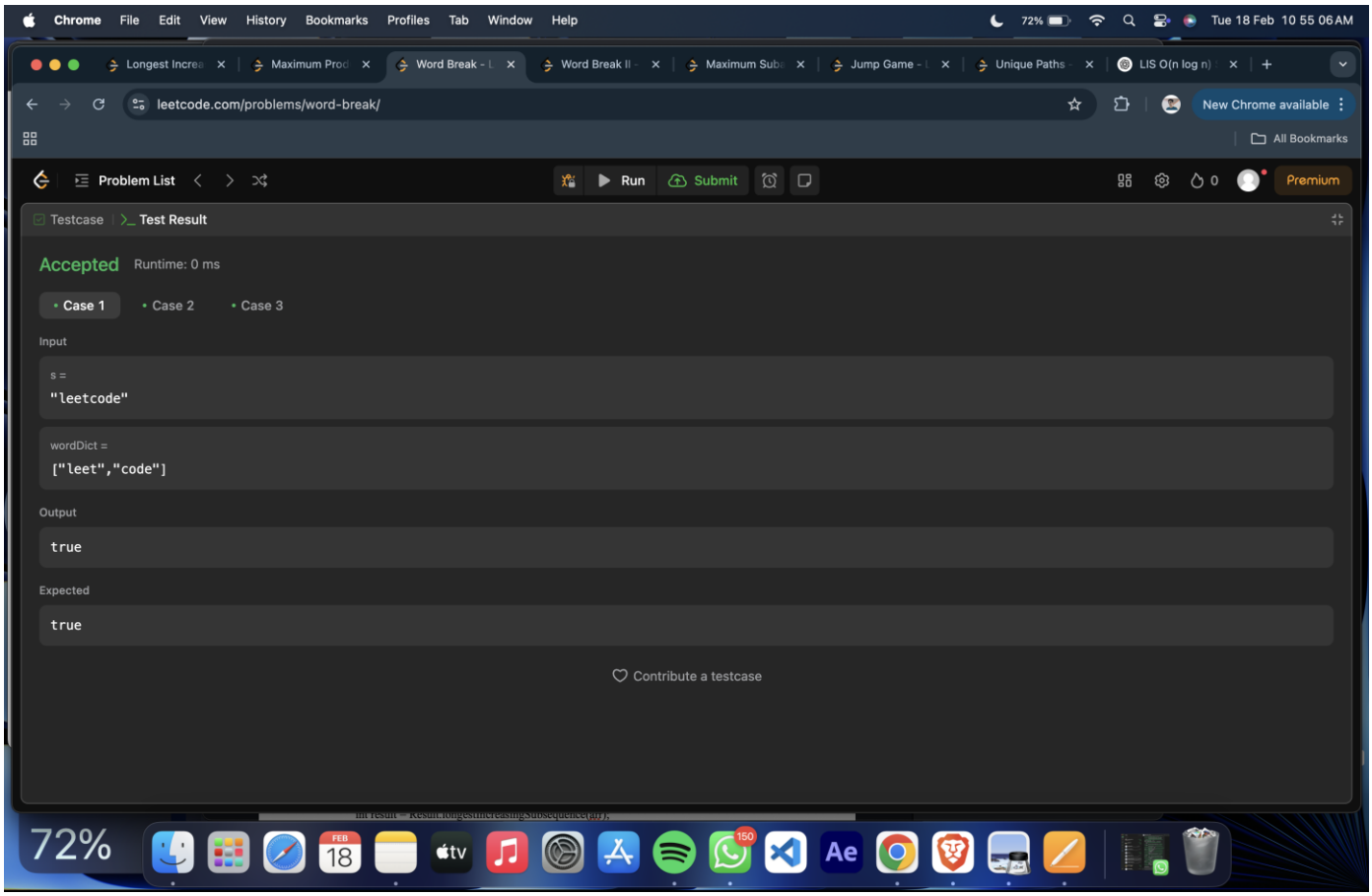
Aim:

Unique Path

Code:

```
class Solution {
    public int uniquePaths(int m, int n) {
        int N = m + n - 2;  // Total moves
        int K = Math.min(m - 1, n - 1);  // Choose the smaller value to reduce computations
        long result = 1;  // Use long to prevent overflow

        // Compute C(N, K) using iterative multiplication
        for (int i = 1; i <= K; i++) {
            result = result * (N - i + 1) / i;
        }
         return (int) result;  // Convert back to int (safe since answer ≤ 2 * 10^9)
    }
}
```

Output:



Case 1

Problem 4

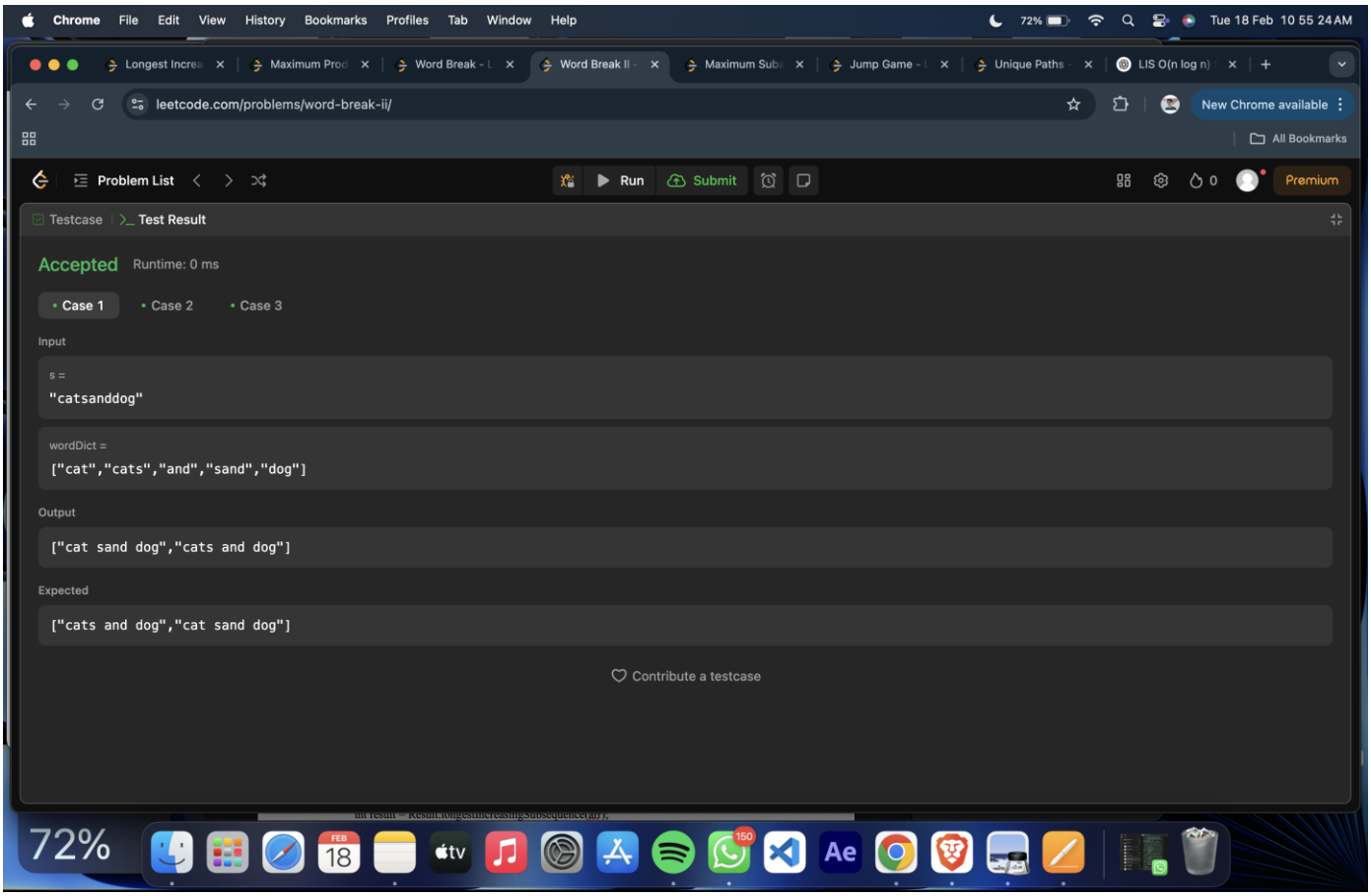
Aim:

Coi Change

Code:

```
import java.util.Arrays;

class Solution {
   public int coinChange(int[] coins, int amount) {
      int max = amount + 1;  // A large value representing "infinity"
      int[] dp = new int[amount + 1];
      Arrays.fill(dp, max);
      dp[0] = 0;  // Base case: 0 coins needed for amount 0

      for (int coin : coins) {
         for (int i = coin; i <= amount; i++) {
            dp[i] = Math.min(dp[i], 1 + dp[i - coin]);  // DP transition
         }
      }
return dp[amount] == max ? -1 : dp[amount];
   }
}
```

Output:



Problem 5

Aim:

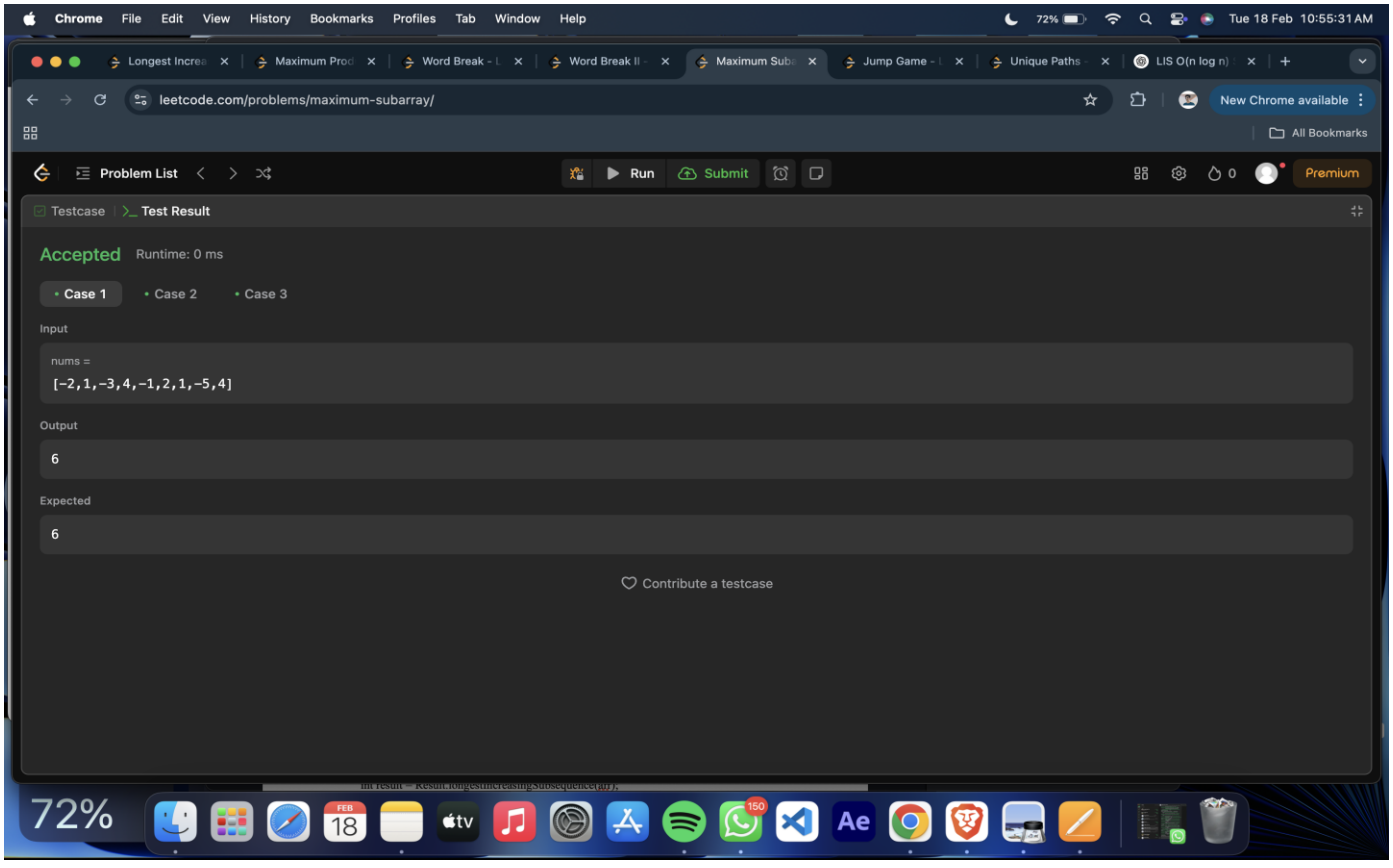
Perfect Square

Code:

```
import java.util.*;

class Solution {
    public int numSquares(int n) {
        Queue<Integer> queue = new LinkedList<>();
        Set<Integer> visited = new HashSet<>();
        queue.add(n);
        visited.add(n);

        int level = 0;
        while (!queue.isEmpty()) {
            level++;
            int size = queue.size();
            for (int i = 0; i < size; i++) {
                int remainder = queue.poll();
                for (int j = 1; j * j <= remainder; j++) {
                    int next = remainder - (j * j);
                    if (next == 0) return level;  // Found the answer
                    if (!visited.contains(next)) {
                        queue.add(next);
```

```
                    visited.add(next);
                }
            }
        }
    }
    return -1;
  }
}
```

Output:



Problem 6

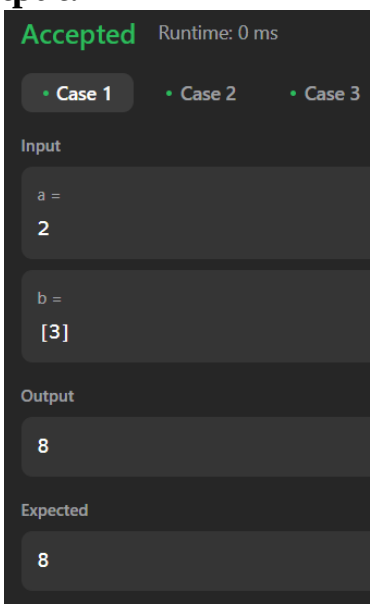
Aim:

Super Pow

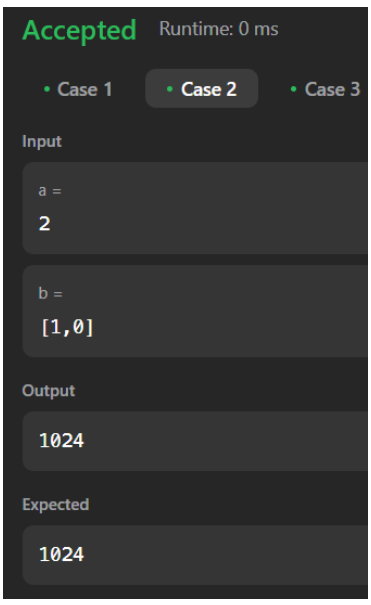
Code:

```
class Solution {
private:
    int solve(int base, int power, int mod) {
        int ans = 1;
        while (power > 0) {
            if (power & 1) {
                ans = (ans * base) % mod;
            }
            base = (base * base) % mod;
            power >>= 1;
        }
        return ans;
    }

public:
    int superPow(int a, vector<int>& b) {
        a%=1337;
        int n = b.size();
        int m = 1140;
        int expi = 0;
        for(int i : b){
            expi = (expi*10+i)%m;
        }
        if (expi == 0) {
            expi = m;
        }
        return solve(a,expi,1337);
    }
};
```

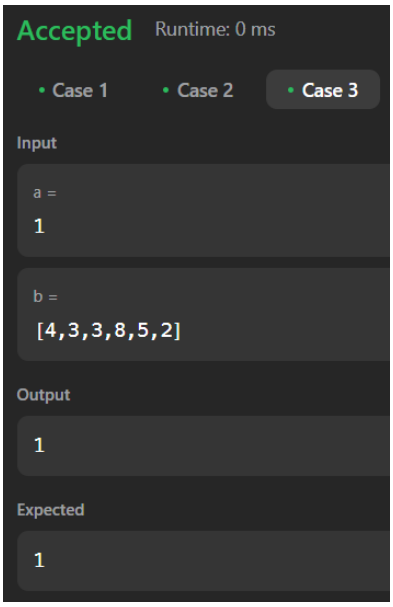
Output:



Case 1



Case 2



Case 3

Problem 7

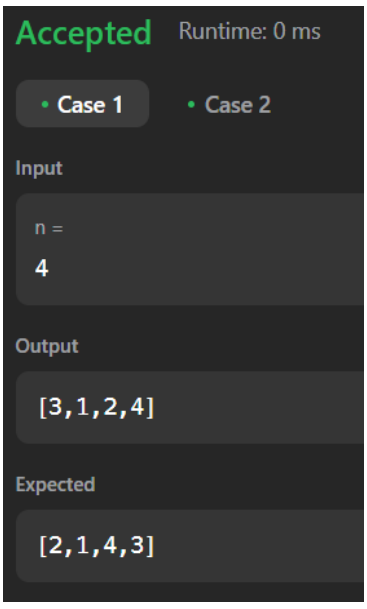
Aim:

Beautiful Array

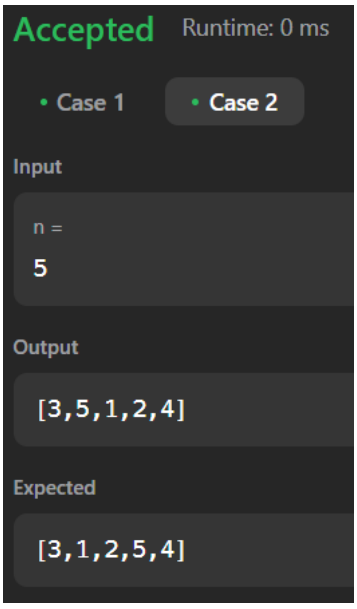
Code:

```
class Solution {
public:
   int partition(vector<int> &v, int start, int end, int mask)
   {
      int j = start;
      for(int i = start; i <= end; i++)
      {
         if((v[i] & mask) != 0)
         {
            swap(v[i], v[j]);
            j++;
         }
      }
      return j;
   }

   void sort(vector<int> & v, int start, int end, int mask)
   {
      if(start >= end) return;
      int mid = partition(v, start, end, mask);
      sort(v, start, mid - 1, mask << 1);
      sort(v, mid, end, mask << 1);
   }

   vector<int> beautifulArray(int N) {
      vector<int> ans;
      for(int i = 0; i < N; i++) ans.push_back(i + 1);
      sort(ans, 0, N - 1, 1);
      return ans;
   }
};
```

Output:



Case 1



Case 2

Problem 8

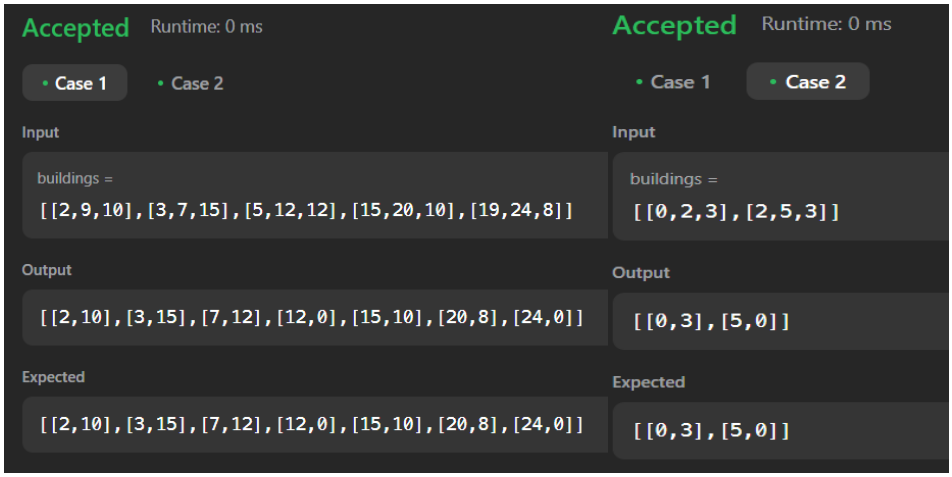
Aim:

The Skyline Problem

Code:

```
class Solution {
public:
   vector<vector<int>> getSkyline(vector<vector<int>>& buildings) {
      int edge_idx = 0;
      vector<pair<int, int>> edges;
      priority_queue<pair<int, int>> pq;
      vector<vector<int>> skyline;

      for (int i = 0; i < buildings.size(); ++i) {
         const auto &b = buildings[i];
         edges.emplace_back(b[0], i);
         edges.emplace_back(b[1], i);
      }
      std::sort(edges.begin(), edges.end());

      while (edge_idx < edges.size()) {
         int curr_height;
         const auto &[curr_x, _] = edges[edge_idx];
         while (edge_idx < edges.size() &&
                curr_x == edges[edge_idx].first) {
            const auto &[_, building_idx] = edges[edge_idx];
            const auto &b = buildings[building_idx];
            if (b[0] == curr_x)
               pq.emplace(b[2], b[1]);
            ++edge_idx;
         }
         while (!pq.empty() && pq.top().second <= curr_x)
            pq.pop();
         curr_height = pq.empty() ? 0 : pq.top().first;
         if (skyline.empty() || skyline.back()[1] != curr_height)
            skyline.push_back({curr_x, curr_height});
      }
      return skyline;
   }
};
```

Output:



Case 1 Case 2