Problem 1

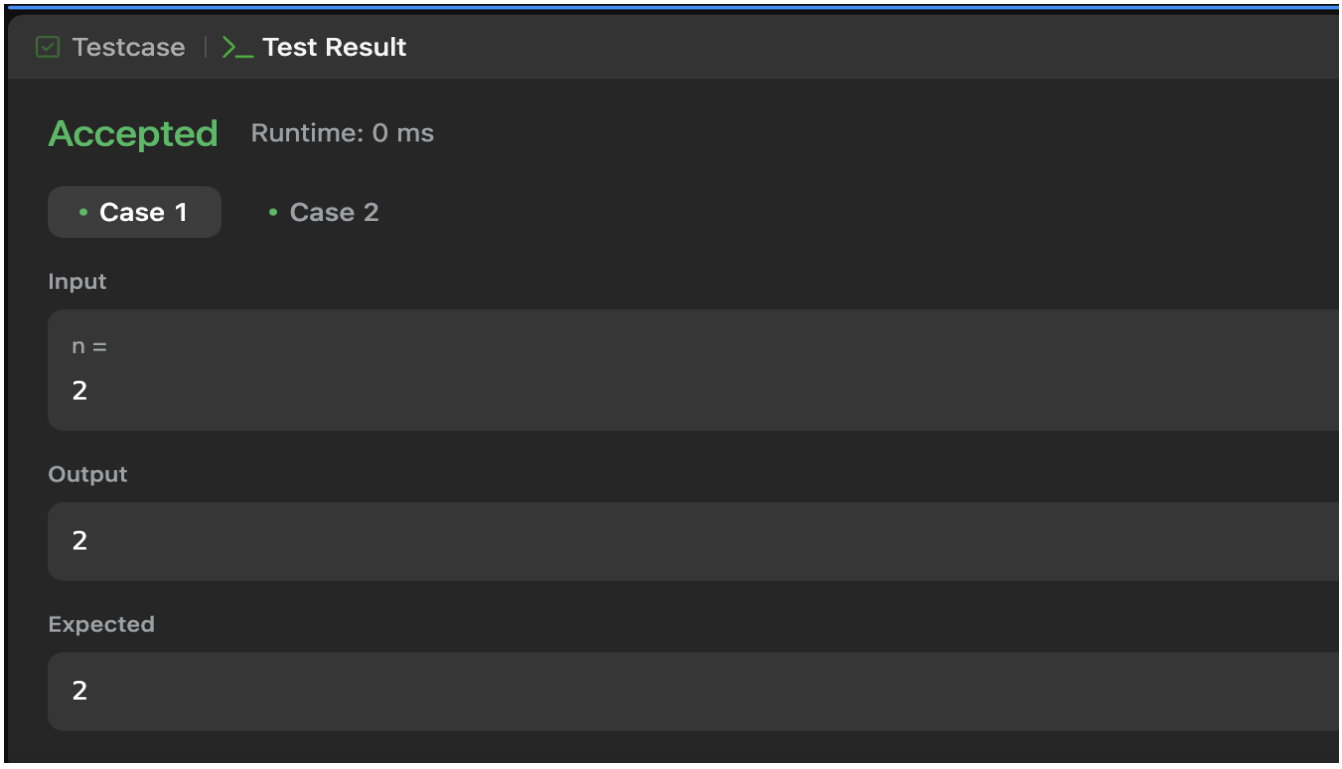
Aim:

Climbing Stairs

Code:

```
class Solution {
public int climbStairs(int n) {
if (n <= 3) return n;
int prev1 = 3;
int prev2 = 2;
int cur = 0;
for (int i = 3; i < n; i++) {
cur = prev1 + prev2;
prev2 = prev1;
prev1 = cur;
}
return cur;
 }
}
```

Output:



Problem 2

Aim:

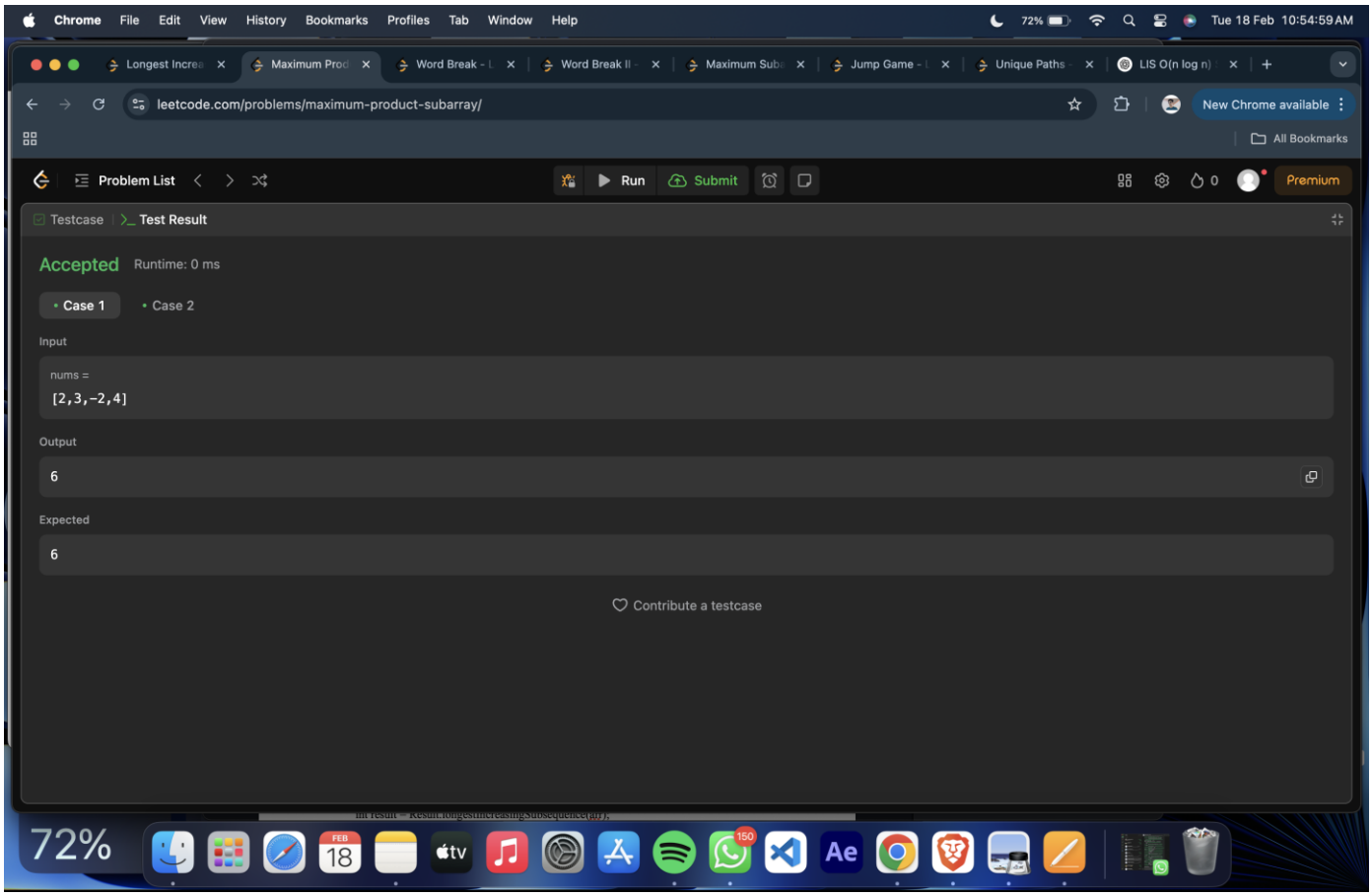
Maximum Product Subarray

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

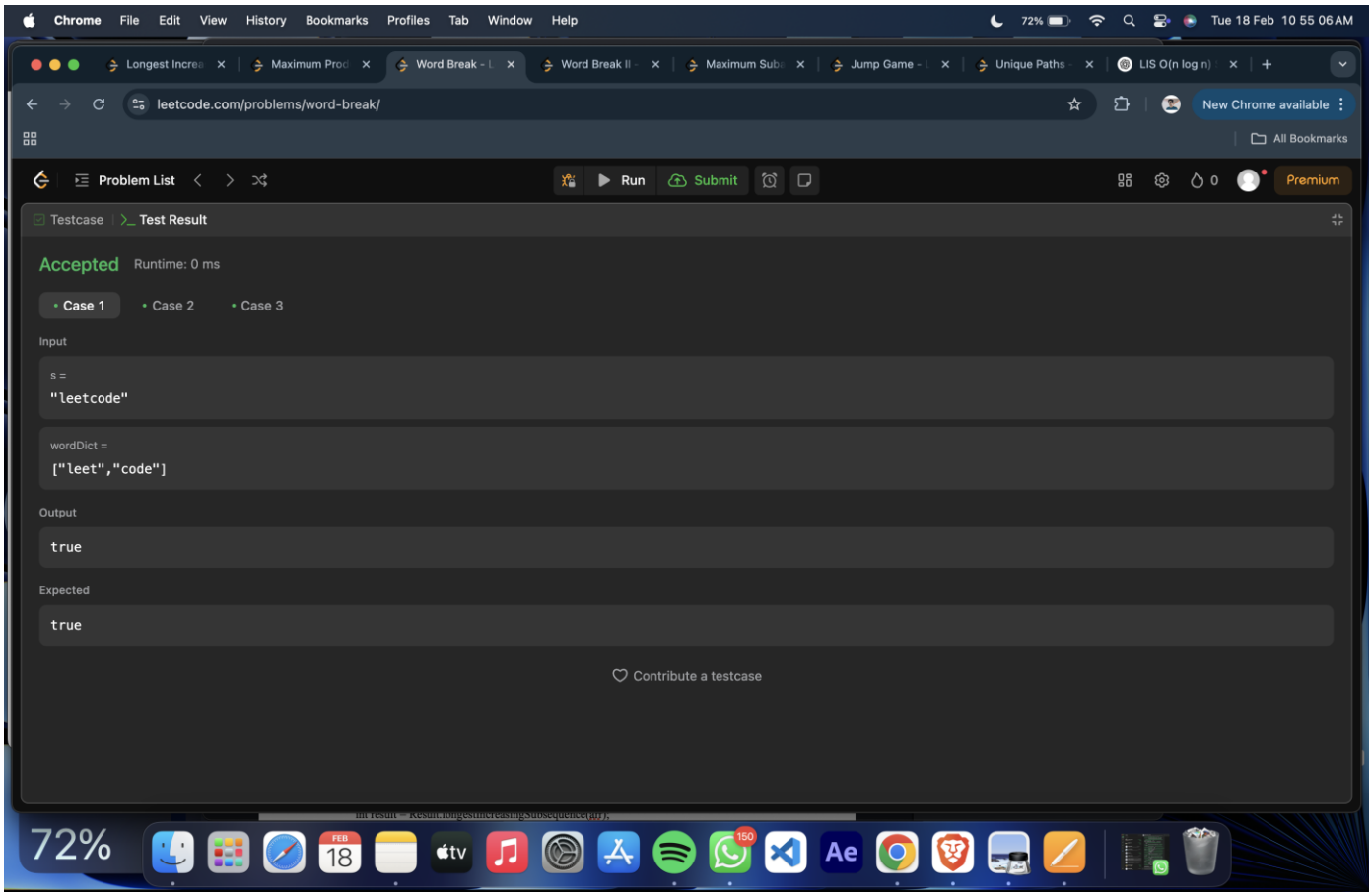
Aim:

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

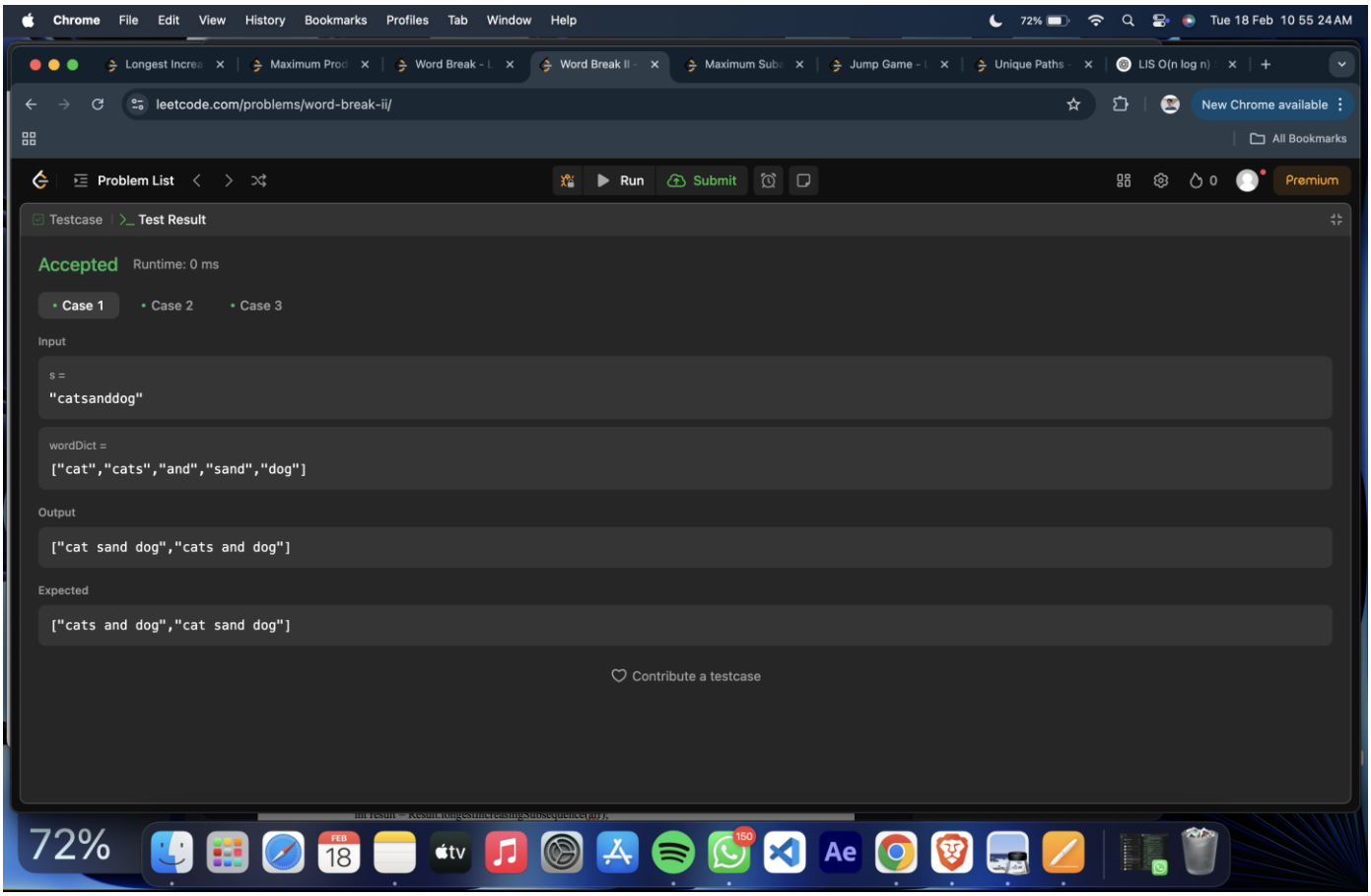
Aim:

Coin 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

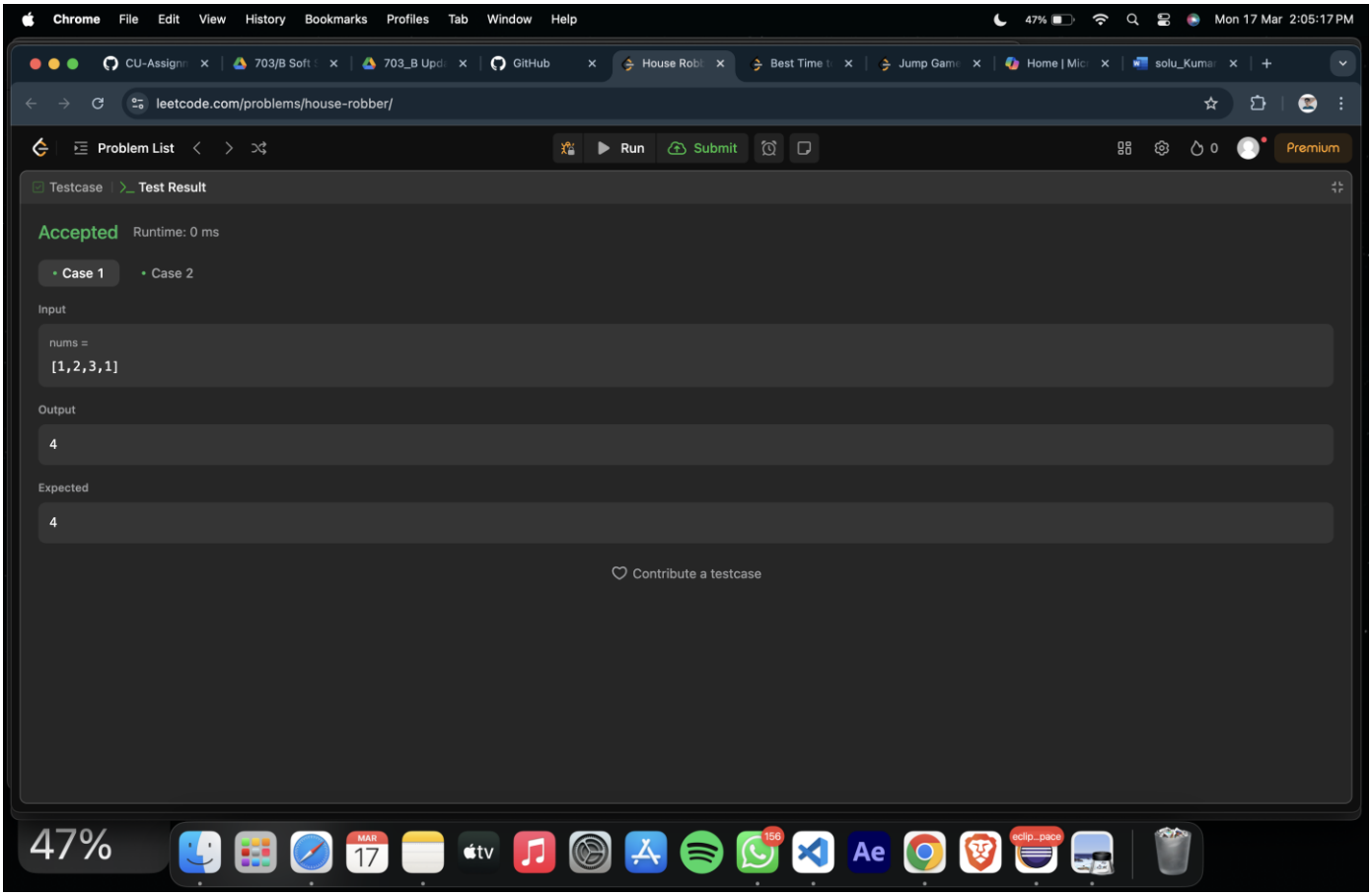
Aim:

House Robber

Code:

```
class Solution {
public int rob(int[] nums) {
int n = nums.length;

if (n == 1) {
return nums[0];
}

int[] dp = new int[n];

dp[0] = nums[0];
dp[1] = Math.max(nums[0], nums[1]);

for (int i = 2; i < n; i++) {
dp[i] = Math.max(dp[i - 1], nums[i] + dp[i - 2]);
}

return dp[n - 1];
}
}
```

Output:



Problem 6

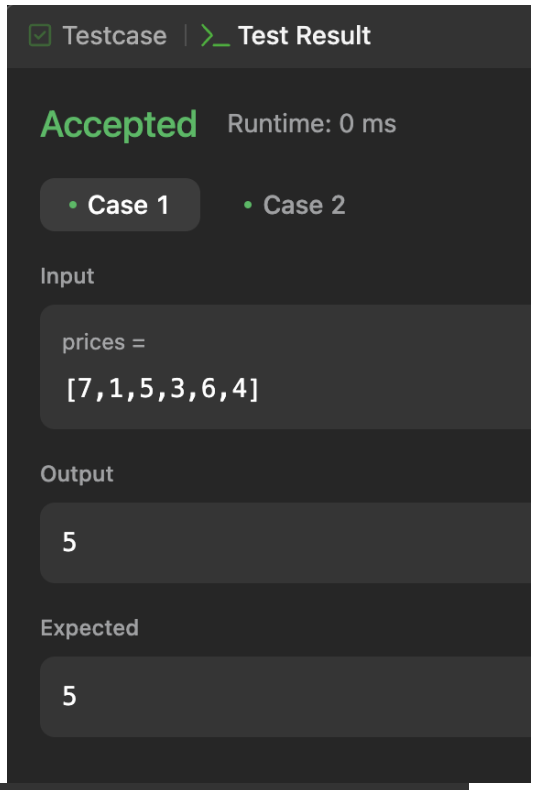
Aim:

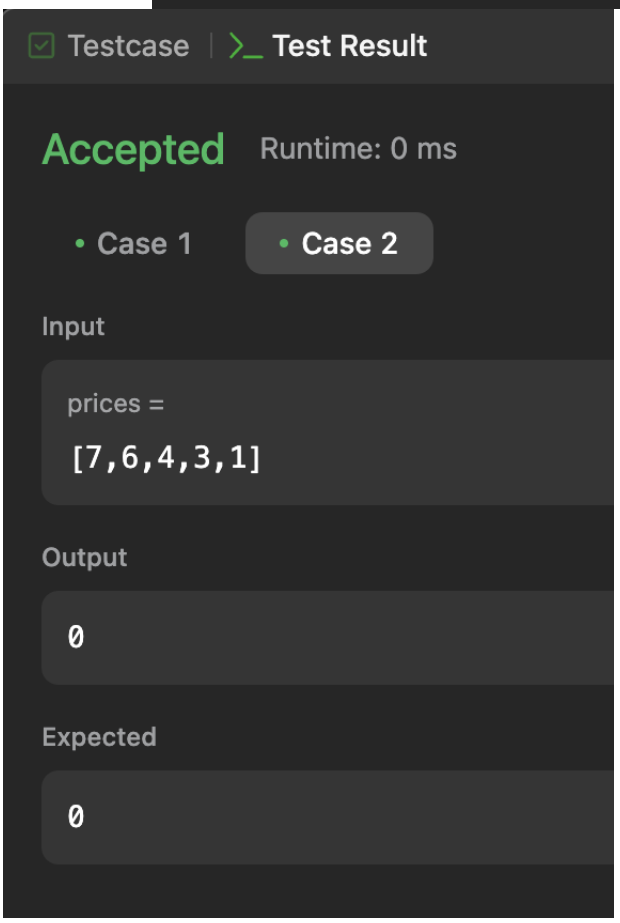
Best Time to Buy and Sell Stock

Code:

```
class Solution {
public int maxProfit(int[] prices) {
int buyPrice = prices[0];
int profit = 0;

for (int i = 1; i < prices.length; i++) {
if (buyPrice > prices[i]) {
buyPrice = prices[i];
}

profit = Math.max(profit, prices[i] - buyPrice);
}

return profit;
}
}
```

Output:





Case 1 Case 2 Case 3

Problem 7

Aim:

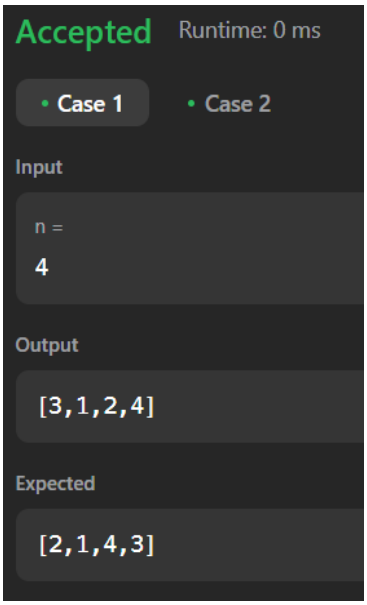
Beautiful Array

Code:

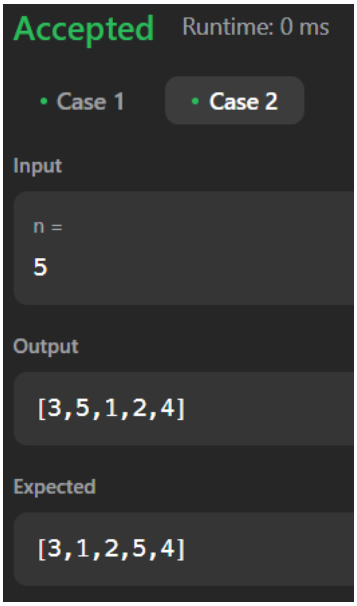
```
class Solution {
public:
    int partition(vector<int> &v, int start, int end, int mask)
    {
```

```
        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:

Jump Game

Code:

```
class Solution {
public boolean canJump(int[] nums) {
int goal = nums.length - 1;

for (int i = nums.length - 2; i >= 0; i--) {
```

```
if (i + nums[i] >= goal) {
goal = i;
}
}

return goal == 0;
}
}
```