DEPARTMENT OF
COMPUTER SCIENCE & ENGINEERING
CHANDIGARH UNIVERSITY
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EXPERIMENT-5

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

PROBLEM-1

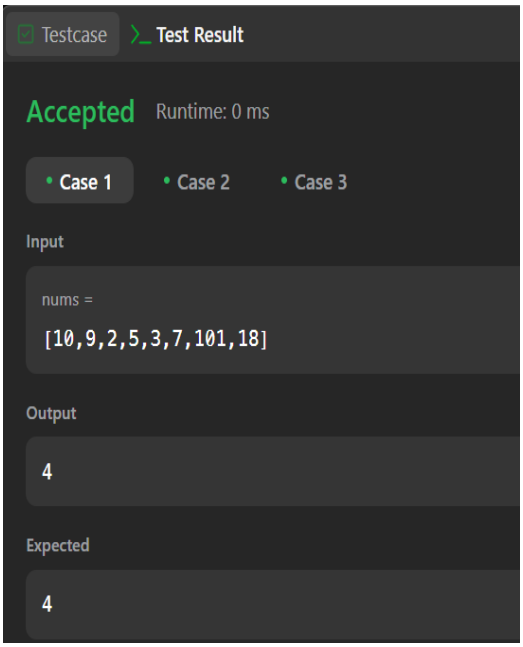
AIM:-

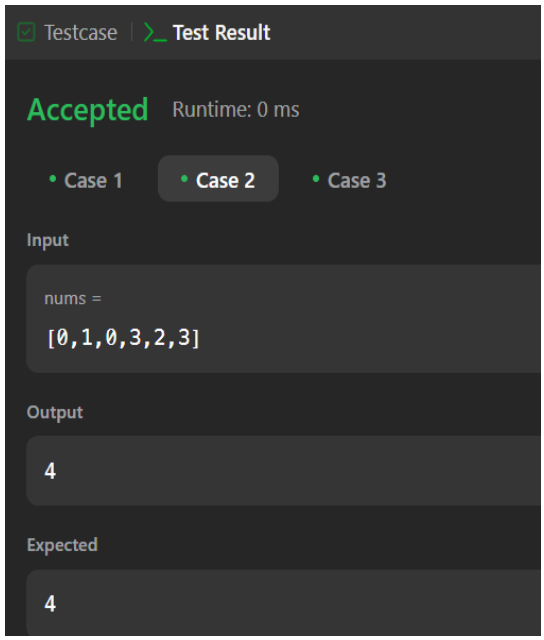
Longest Increasing Subsequence

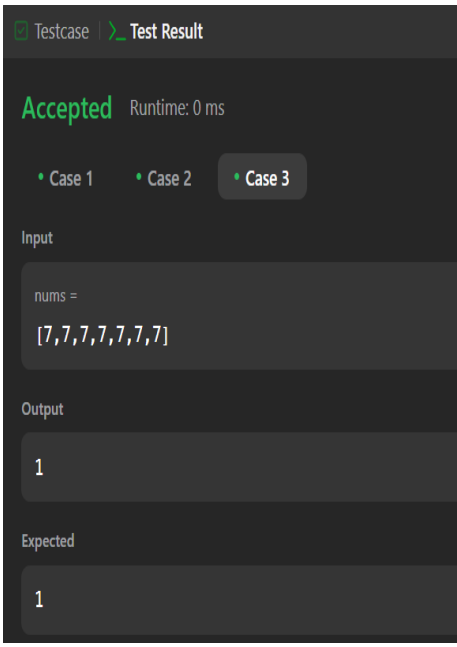
CODE:-

```
public class Solution {
    public int lengthOfLIS(int[] nums) {
        if (nums == null || nums.length == 0) {
            return 0;
        }
        int n = nums.length;
        int[] dp = new int[n];
        Arrays.fill(dp, 1);
        for (int i = 1; i < n; ++i) {
            for (int j = 0; j < i; ++j) {
                if (nums[i] > nums[j]) {
                    dp[i] = Math.max(dp[i], dp[j] + 1);
                }
            }
        }
        int maxLength = Arrays.stream(dp).max().orElse(0);
        return maxLength;
    }
}
```

OUTPUT:-







PROBLEM-2

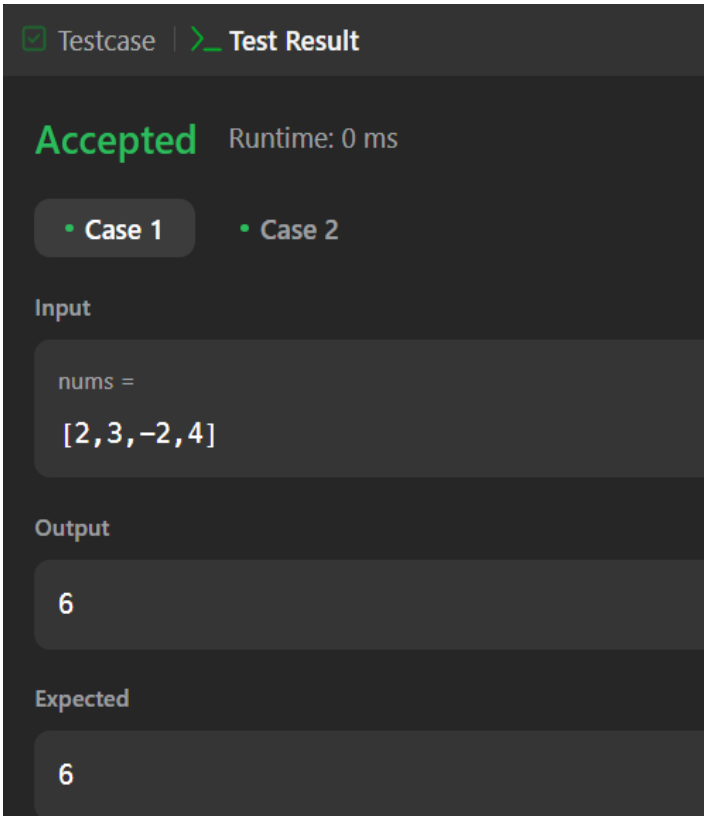
AIM:-

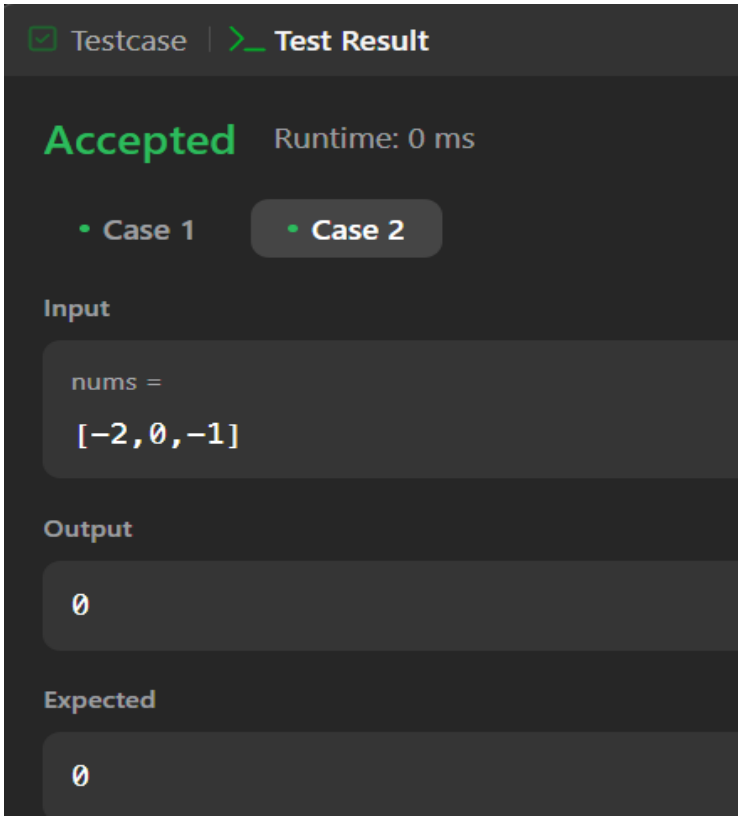
Maximum Product Subarray

CODE:-

```
class Solution {
    public int maxProduct(int[] nums) {
        int res = Integer.MIN_VALUE;
        for (int n : nums) {
            res = Math.max(res, n);
        }

        int curMax = 1, curMin = 1;

        for (int n : nums) {
            int temp = curMax * n;
            curMax = Math.max(temp, Math.max(curMin * n, n));
            curMin = Math.min(temp, Math.min(curMin * n, n));

            res = Math.max(res, curMax);
        }

        return res;
    }
}
```

OUTPUT:





PROBLEM-3

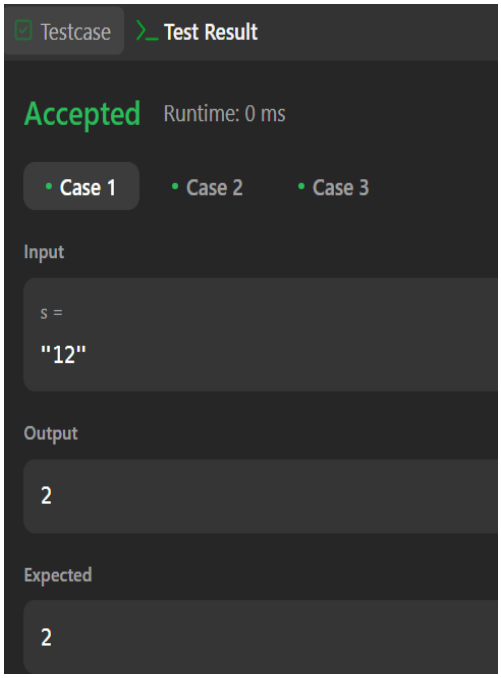
AIM:-

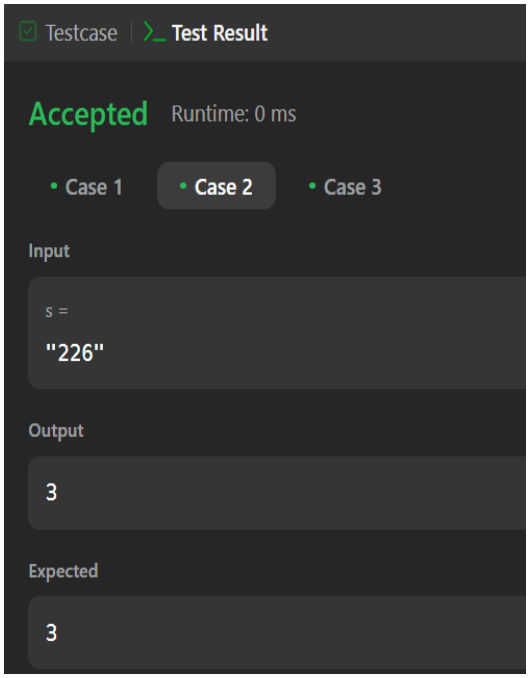
Decode Ways

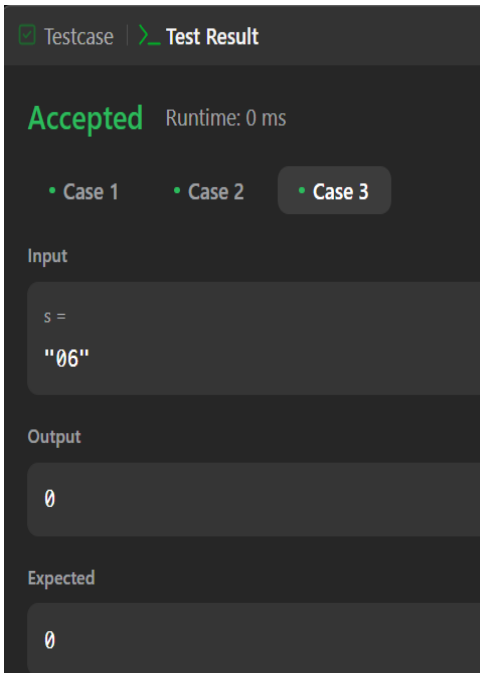
CODE:-

```
class Solution {
    public int numDecodings(String s) {
        if (s.charAt(0) == '0') {
            return 0;
        }

        int n = s.length();
        int[] dp = new int[n + 1];
        dp[0] = dp[1] = 1;

        for (int i = 2; i <= n; i++) {
            int one = Character.getNumericValue(s.charAt(i - 1));
            int two = Integer.parseInt(s.substring(i - 2, i));

            if (1 <= one && one <= 9) {
                dp[i] += dp[i - 1];
            }
            if (10 <= two && two <= 26) {
                dp[i] += dp[i - 2];
            }
        }

        return dp[n];
    }
}
```

OUTPUT:-







PROBLEM-4

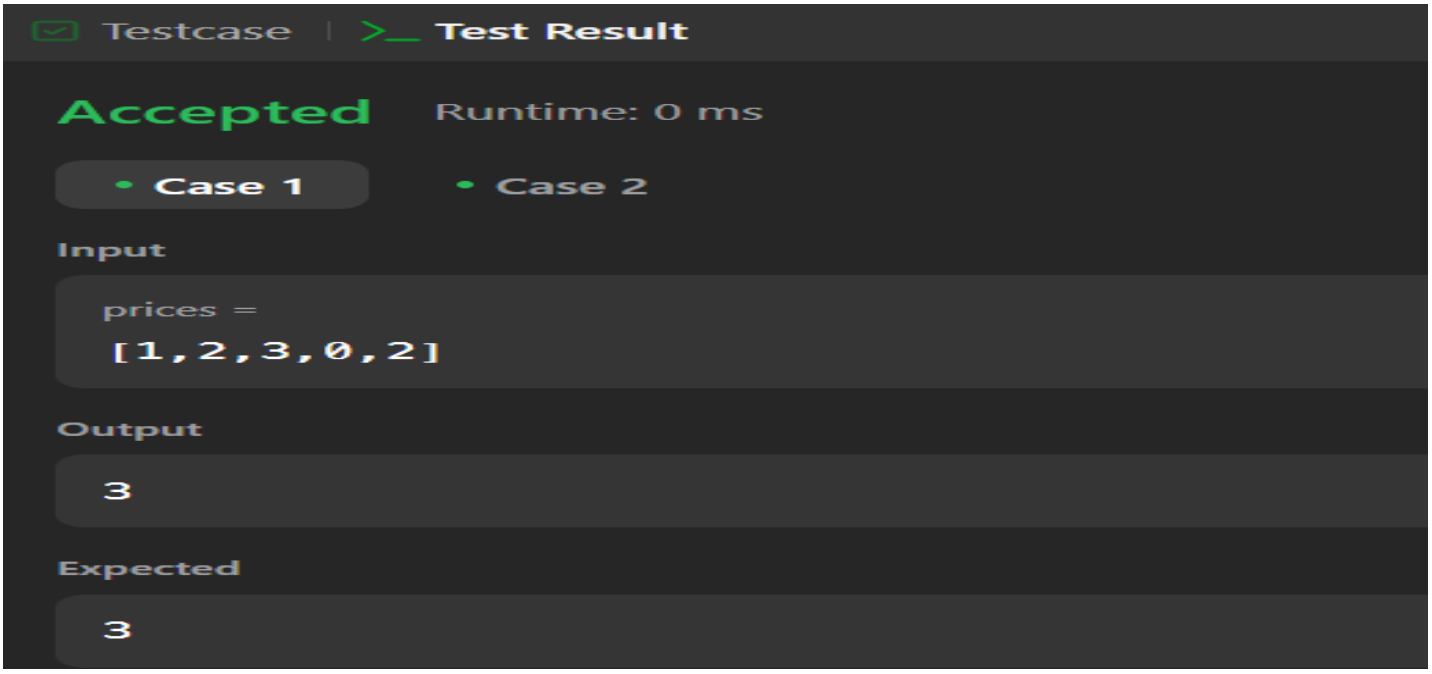
AIM:-

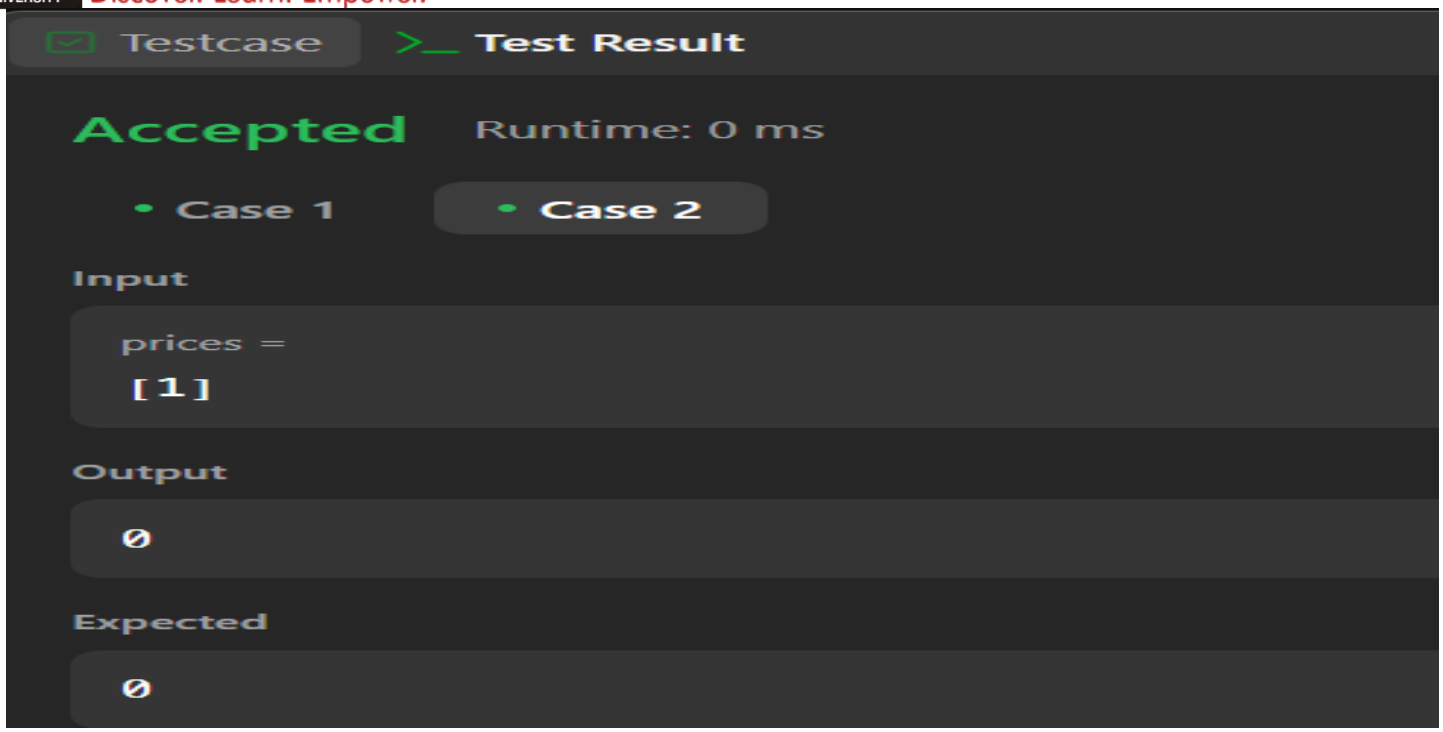
Best time to buy and Sell a Stock with Cooldown

CODE:-

```
class Solution {
    public int maxProfit(int[] prices) {
        int coolDown = 0, sell = 0, hold = Integer.MIN_VALUE;
        for (int stockPrice : prices) {
            int prevCoolDown = coolDown, prevSell = sell;
            coolDown = Math.max(prevCoolDown, sell);
            sell = hold + stockPrice;
            hold = Math.max(hold, prevCoolDown - stockPrice);
        }
        return Math.max(coolDown, sell);
    }
}
```

OUTPUT:-





PROBLEM-5

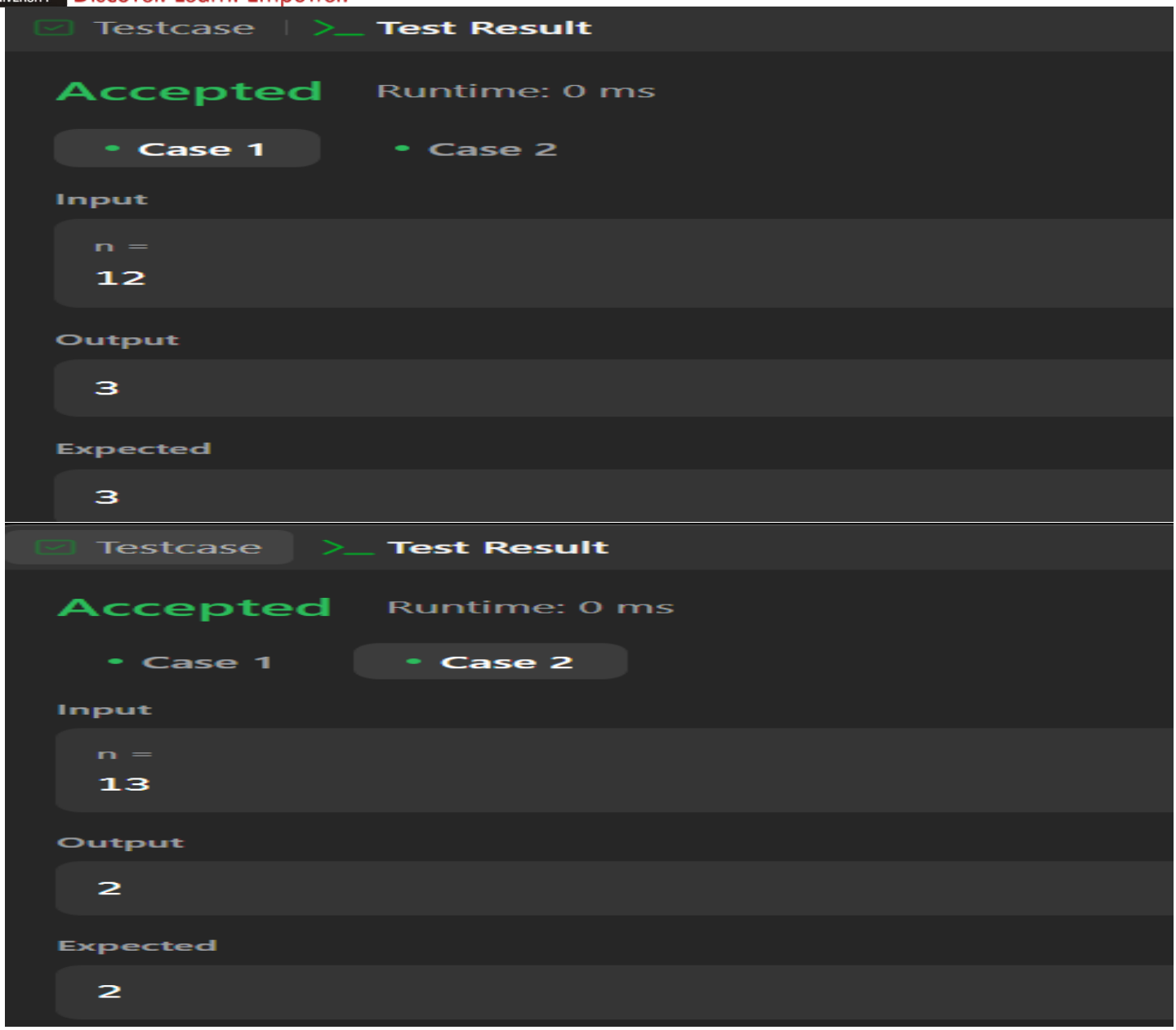
AIM:-

Perfect Squares

CODE:-

```
class Solution {
    public int numSquares(int n) {
        int[] dp = new int[n + 1];
        Arrays.fill(dp, Integer.MAX_VALUE);
        dp[0] = 0;
        for (int i = 1; i <= n; ++i) {
            int min_val = Integer.MAX_VALUE;
            for (int j = 1; j * j <= i; ++j) {
                min_val = Math.min(min_val, dp[i - j * j] + 1);
            }
            dp[i] = min_val;
        }
        return dp[n];
    }
}
```

OUTPUT:-



PROBLEM-6

AIM:-

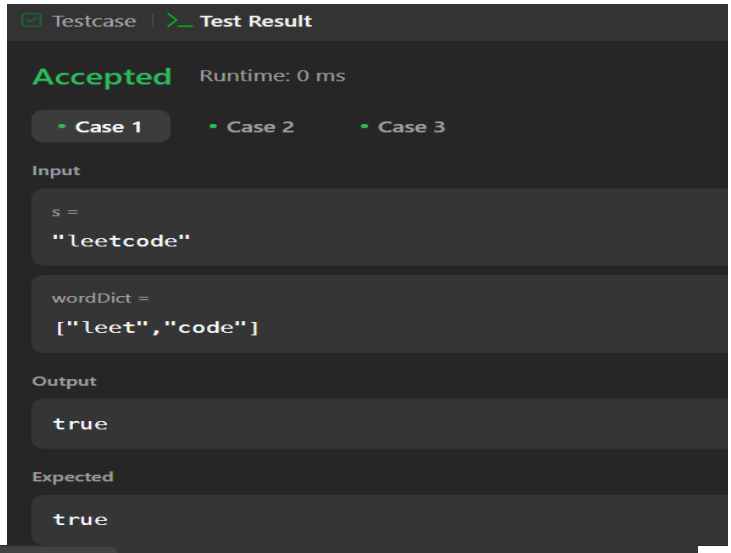
Word Break

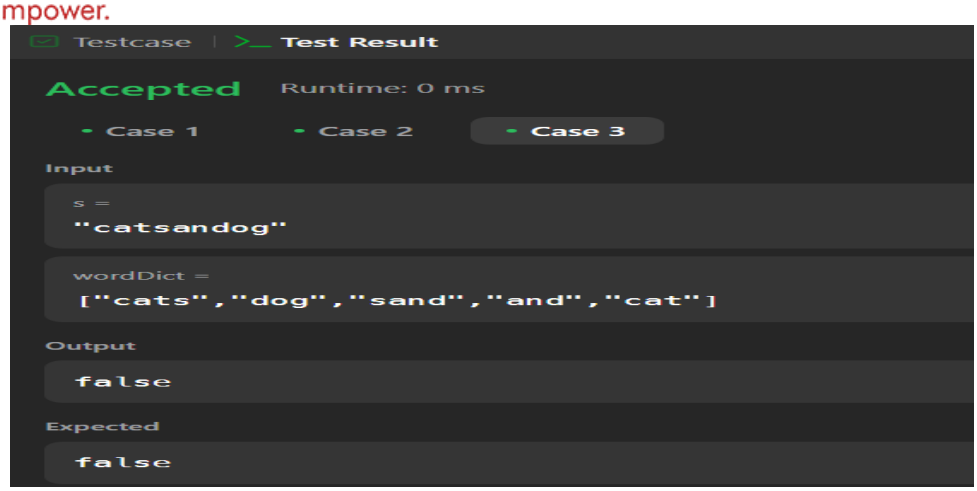
CODE:-

```
class Solution {
    public boolean wordBreak(String s, List<String> wordDict) {
        int n = s.length();
        boolean[] dp = new boolean[n + 1];
        dp[0] = true;
        int max_len = 0;
        for (String word : wordDict) {
            max_len = Math.max(max_len, word.length());
        }
        for (int i = 1; i <= n; i++) {
            for (int j = i - 1; j >= Math.max(i - max_len - 1, 0); j--) {
```

```
                if (dp[j] && wordDict.contains(s.substring(j, i))) {
                    dp[i] = true;
                    break;
                }
            }
        }
        return dp[n];
    }
}
```

OUTPUT:-





PROBLEM-7

AIM:-

Word Break 2

CODE:-

```
class Solution {
    public List<String> wordBreak(String s, List<String> wordDict) {
        int n = s.length();
        Set<String> wordSet = new HashSet<>(wordDict);
        List<List<String>> dp = new ArrayList<>();
        for (int i = 0; i <= n; i++) {
            dp.add(new ArrayList<>());
        }
        dp.get(0).add("");
        for (int i = 1; i <= n; i++) {
            List<String> temp = new ArrayList<>();
            for (int j = 0; j < i; j++) {
                String suffix = s.substring(j, i);
                if (wordSet.contains(suffix)) {
                    for (String substring : dp.get(j)) {
                        temp.add(substring + (substring.isEmpty() ? "" : " ") + suffix);
                    }
                }
            }
            dp.set(i, temp);
        }
        return dp.get(n);
    }
}
```

OUTPUT:-

Testcase >_ Test Result

Accepted Runtime: 5 ms

• Case 1 • Case 2 • Case 3

Input

s =
"catsanddog"

wordDict =
["cat","cats","and","sand","dog"]

Output

["cat sand dog","cats and dog"]

Expected

["cats and dog","cat sand dog"]

Testcase | >_ Test Result

Accepted Runtime: 5 ms

• Case 1 • Case 2 • Case 3

Input

s =
"pineapplepenapple"

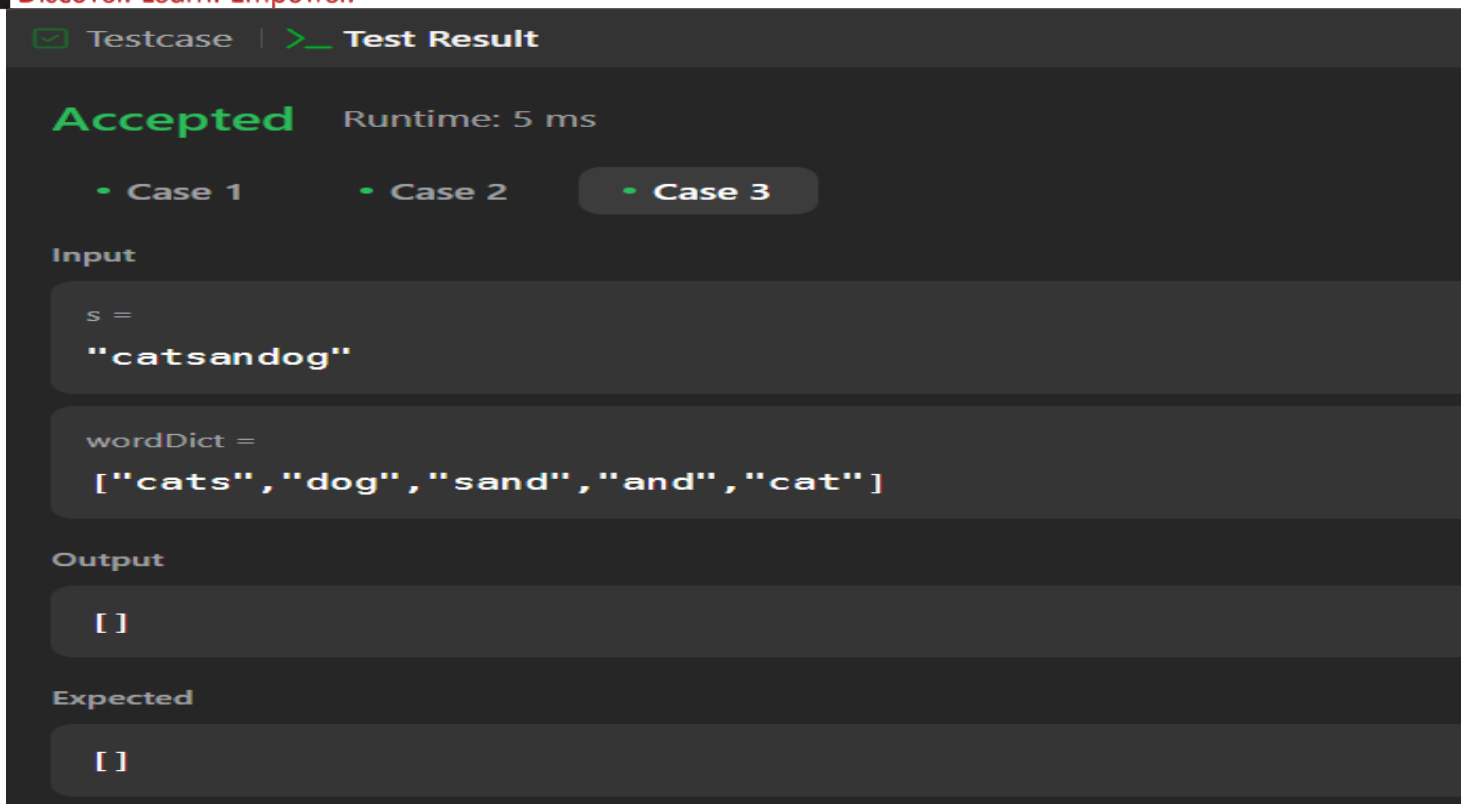
wordDict =
["apple","pen","applepen","pine","pineapple"]

Output

["pine applepen apple","pineapple pen apple","pine apple pen apple"]

Expected

["pine apple pen apple","pineapple pen apple","pine applepen apple"]


Testcase
Test Result
Accepted
Runtime: 5 ms
Case 1
Case 2
Case 3
Input
s =
"catsandog"
wordDict =
["cats","dog","sand","and","cat"]
Output
[]
Expected
[]