

Algorithmic Problem Solving [17ECSE309] 15 Days of DS - Submission

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15 Days of DS

Marks: 05

Platform: Various Platforms

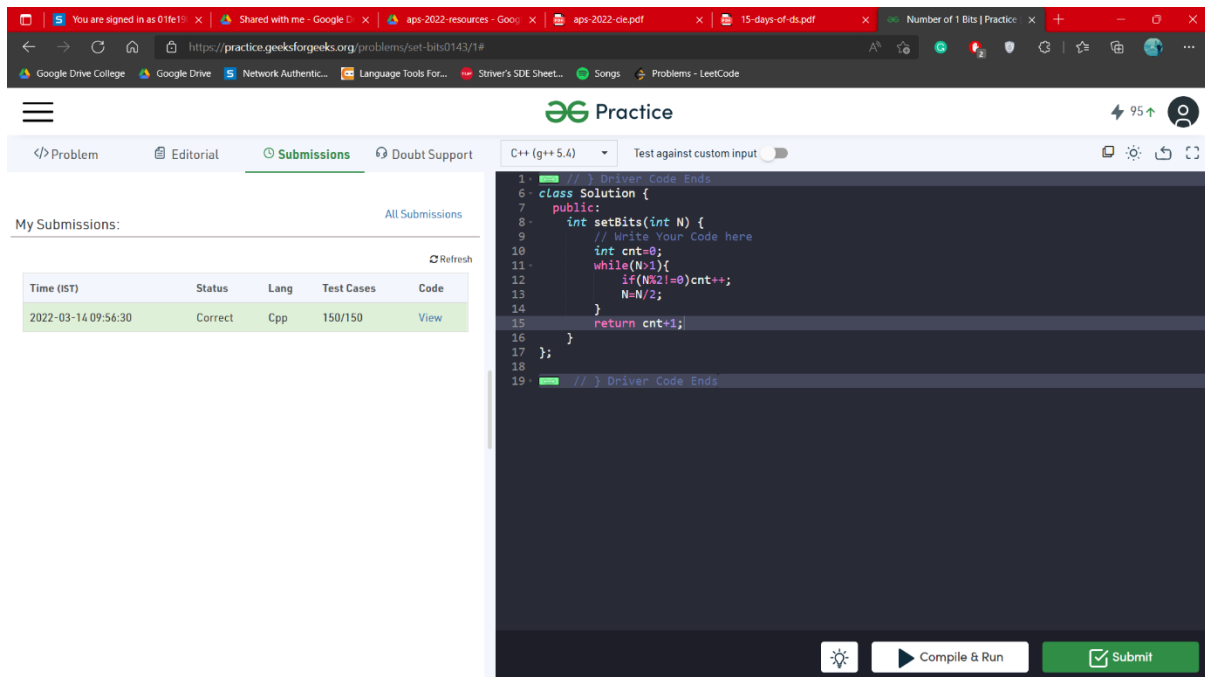
A 15 days challenge where each day you need to do an assigned task. You need to complete this before 15 March 2022. Final submission will be made via email and will have intermediate submissions on various other platforms.

Day 01 Task

Solve count Set Bits in an Integer problem

<https://practice.geeksforgeeks.org/problems/set-bits0143/1>

Screenshot of submission:



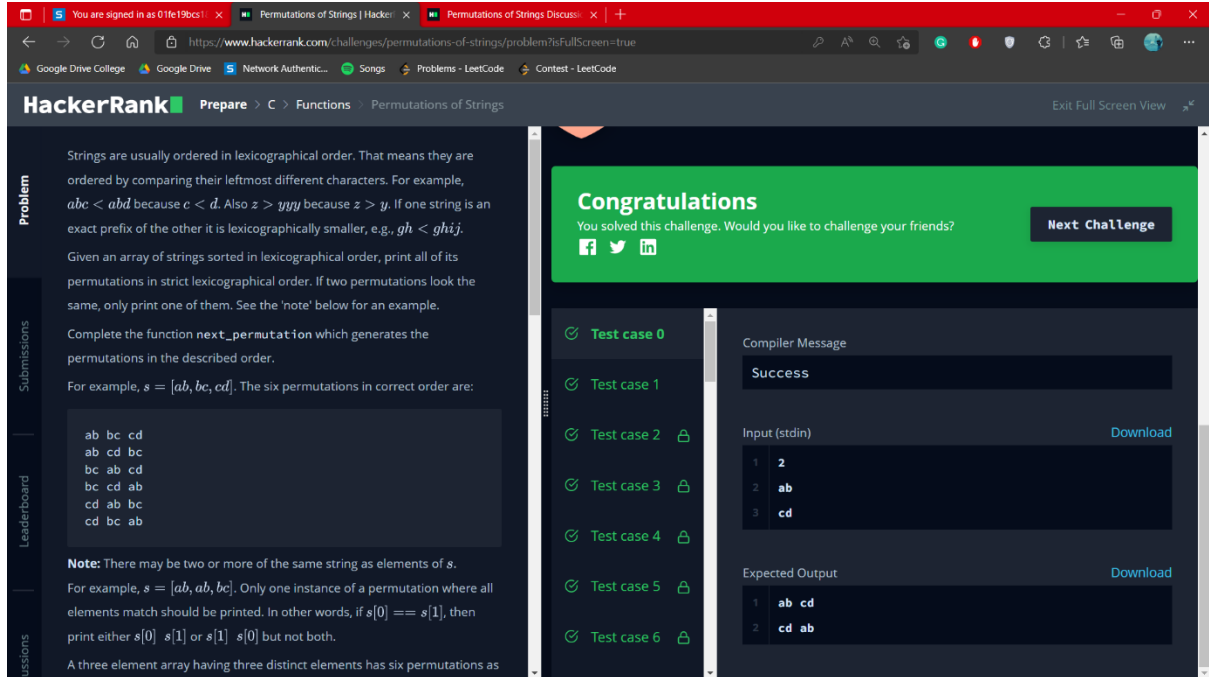
```
1 // Driver Code Ends
2 class Solution {
3 public:
4     int setBits(int N) {
5         // Write Your Code here
6         int cnt=0;
7         while(N>0){
8             if(N%2!=0)cnt++;
9             N=N/2;
10        }
11        return cnt;
12    }
13 };
14 // } Driver Code Ends
```

Day 02 Task

Complete the problem Permutations of Strings

<https://www.hackerrank.com/challenges/permutations-of-strings/>

Screenshot of submission:



The screenshot shows a web browser displaying the HackerRank challenge page for 'Permutations of Strings'. The page is in full-screen mode. On the left, the problem description is visible, explaining that strings are ordered lexicographically and the task is to print all permutations of a given array of strings in strict lexicographical order. The input is an array of strings sorted lexicographically, and the output should be all permutations in strict lexicographical order. An example is given: for `s = [ab, bc, cd]`, the six permutations in correct order are: `ab bc cd`, `ab cd bc`, `bc ab cd`, `bc cd ab`, `cd ab bc`, and `cd bc ab`. A note mentions that there may be two or more of the same string as elements of `s`, and only one instance of a permutation where all elements match should be printed. For example, if `s[0] == s[1]`, then print either `s[0] s[1]` or `s[1] s[0]` but not both. A three element array having three distinct elements has six permutations as

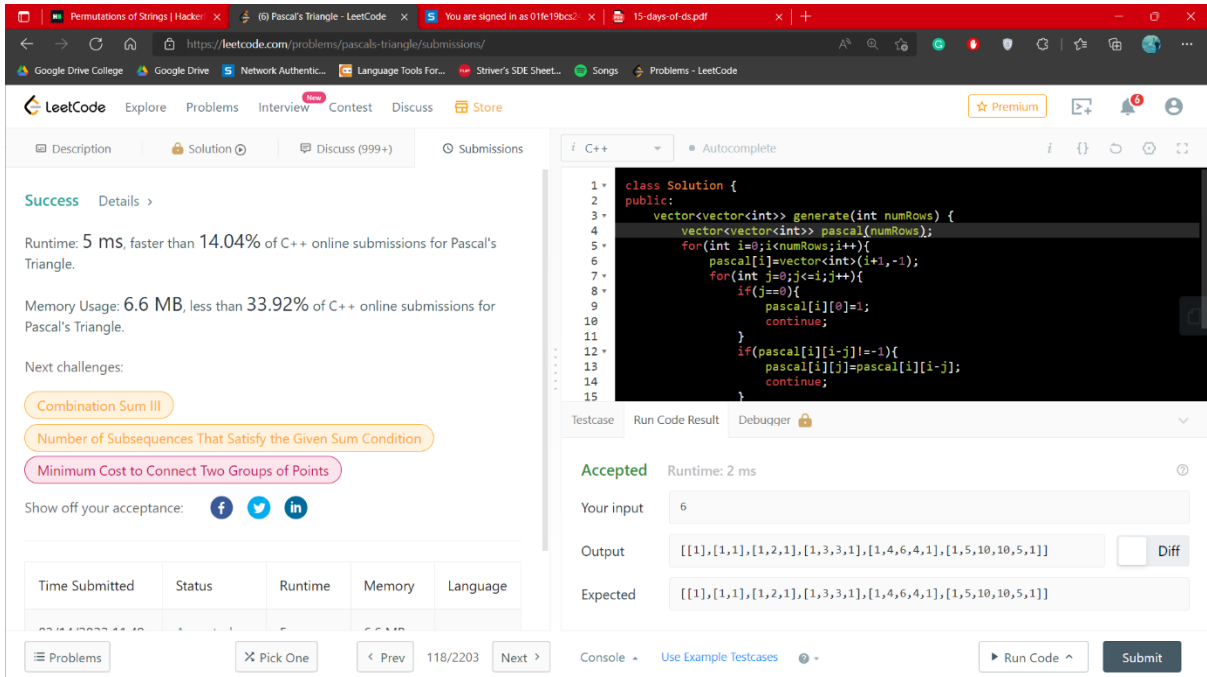
The main content area shows a 'Congratulations' message: 'You solved this challenge. Would you like to challenge your friends?' with a 'Next Challenge' button. Below this, a list of test cases is shown, all marked as 'Test case 0' through 'Test case 6' with green checkmarks. To the right, the 'Compiler Message' section shows 'Success'. The 'Input (stdin)' section shows the input: `2`, `ab`, `cd`. The 'Expected Output' section shows the output: `ab cd`, `cd ab`.

Day 03 Task

Solve the Pascal's Triangle problem

<https://leetcode.com/problems/pascals-triangle/>

Screenshot of submission:



The screenshot shows a web browser window with the LeetCode website. The page displays the submission details for the "Pascal's Triangle" problem. The submission is successful, with a runtime of 5 ms and a memory usage of 6.6 MB. The code is written in C++ and uses a dynamic programming approach to generate the Pascal's Triangle. The submission is accepted, and the output matches the expected result.




Success Details >

Runtime: 5 ms, faster than 14.04% of C++ online submissions for Pascal's Triangle.

Memory Usage: 6.6 MB, less than 33.92% of C++ online submissions for Pascal's Triangle.

Next challenges:

- Combination Sum III
- Number of Subsequences That Satisfy the Given Sum Condition
- Minimum Cost to Connect Two Groups of Points

Show off your acceptance:   

Time Submitted	Status	Runtime	Memory	Language
03/14/2023 14:10	Accepted	5 ms	6.6 MB	C++

```
1 class Solution {
2 public:
3     vector<vector<int>> generate(int numRows) {
4         vector<vector<int>> pascal(numRows);
5         for(int i=0; i<numRows; i++){
6             pascal[i]=vector<int>(i+1,-1);
7             for(int j=0; j<=i; j++){
8                 if(j==0){
9                     pascal[i][0]=1;
10                    continue;
11                }
12                if(pascal[i][i-j]==-1){
13                    pascal[i][j]=pascal[i][i-j];
14                    continue;
15                }
16            }
17        }
18        return pascal;
19    }
20 }
```

Accepted Runtime: 2 ms

Your input: 6

Output: [[1],[1,1],[1,2,1],[1,3,3,1],[1,4,6,4,1],[1,5,10,10,5,1]]

Expected: [[1],[1,1],[1,2,1],[1,3,3,1],[1,4,6,4,1],[1,5,10,10,5,1]]

Diff

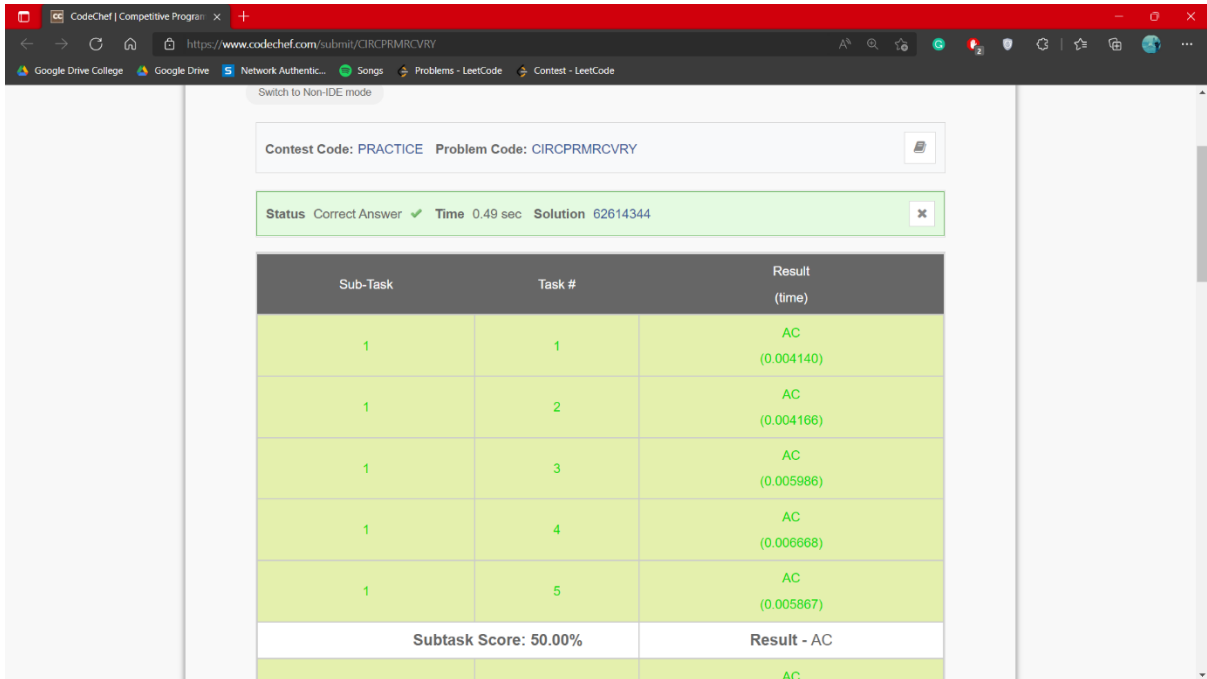
Run Code ^ Submit

Day 04 Task

Solve the Circular Permutation Recovery problem

<https://www.codechef.com/problems/CIRCPRMRCVRY>

Screenshot of submission:



Contest Code: PRACTICE Problem Code: CIRCPRMRCVRY

Status: Correct Answer ✓ Time: 0.49 sec Solution: 62614344

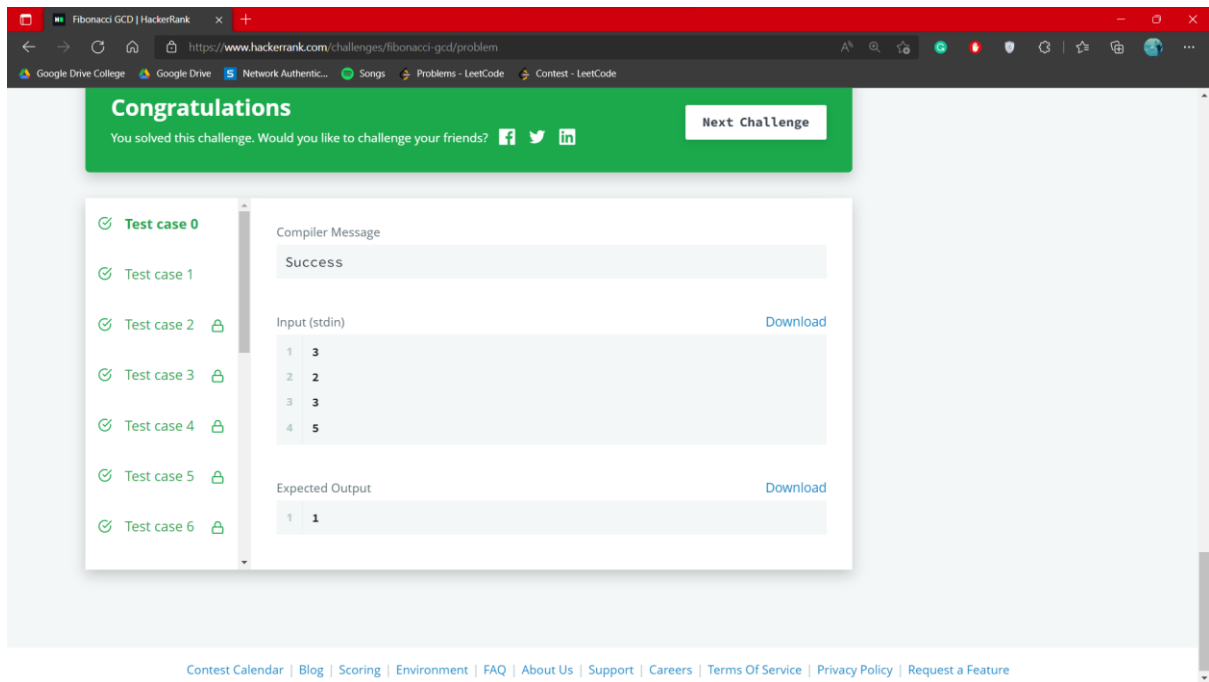
Sub-Task	Task #	Result (time)
1	1	AC (0.004140)
1	2	AC (0.004166)
1	3	AC (0.005986)
1	4	AC (0.006668)
1	5	AC (0.005867)
Subtask Score: 50.00%		Result - AC
		AC

Day 05 Task

Solve the Fibonacci GCD problem

<https://www.hackerrank.com/challenges/fibonacci-gcd/>

Screenshot of submission:

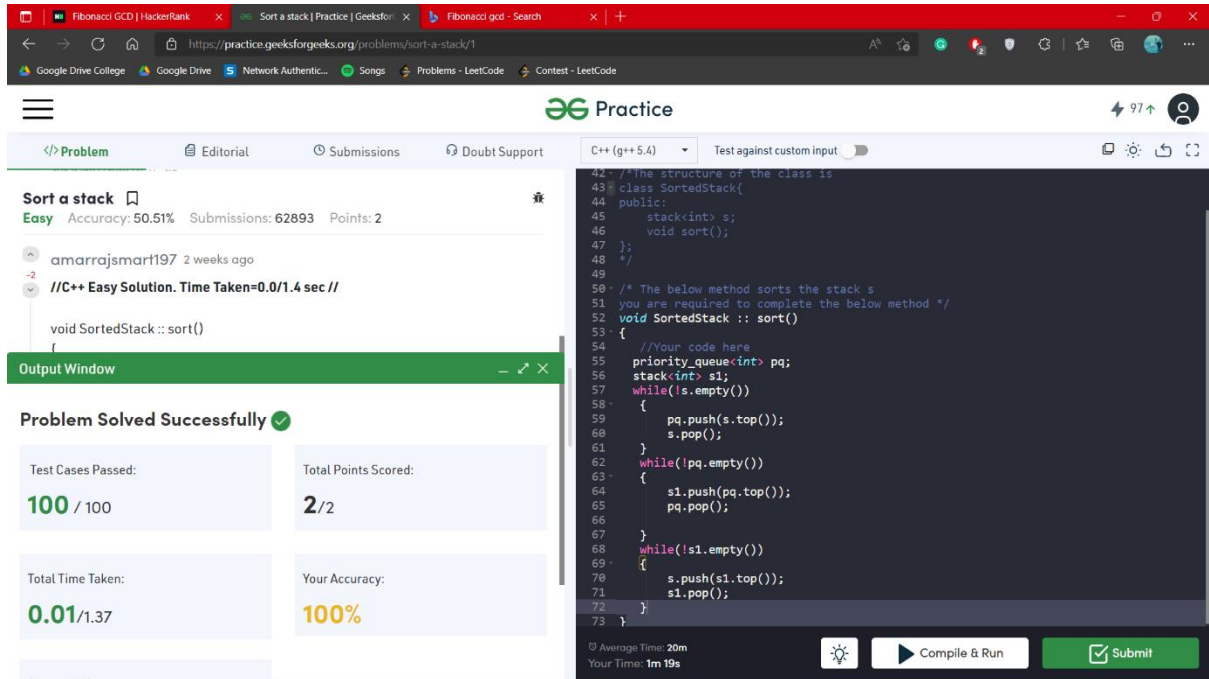


Day 06 Task

Sort a Stack Using Recursion

<https://practice.geeksforgeeks.org/problems/sort-a-stack/1>

Screenshot of submission:



The screenshot shows a web browser window with the URL <https://practice.geeksforgeeks.org/problems/sort-a-stack/1>. The page displays the 'Sort a stack' problem, which is marked as 'Easy'. The submission status is 'Problem Solved Successfully' with a green checkmark. The test cases passed are 100 / 100, and the total points scored are 2/2. The total time taken is 0.01/1.37, and the accuracy is 100%.

The code editor shows the following C++ code:

```
42. /*The structure of the class is
43. class SortedStack{
44. public:
45.     stack<int> s;
46.     void sort();
47. };
48. */
49.
50. /* The below method sorts the stack s
51. you are required to complete the below method */
52. void SortedStack :: sort()
53. {
54.     //Your code here
55.     priority_queue<int> pq;
56.     stack<int> s1;
57.     while(!s.empty())
58.     {
59.         pq.push(s.top());
60.         s.pop();
61.     }
62.     while(!pq.empty())
63.     {
64.         s1.push(pq.top());
65.         pq.pop();
66.     }
67.     while(!s1.empty())
68.     {
69.         s.push(s1.top());
70.         s1.pop();
71.     }
72. }
73. }
```

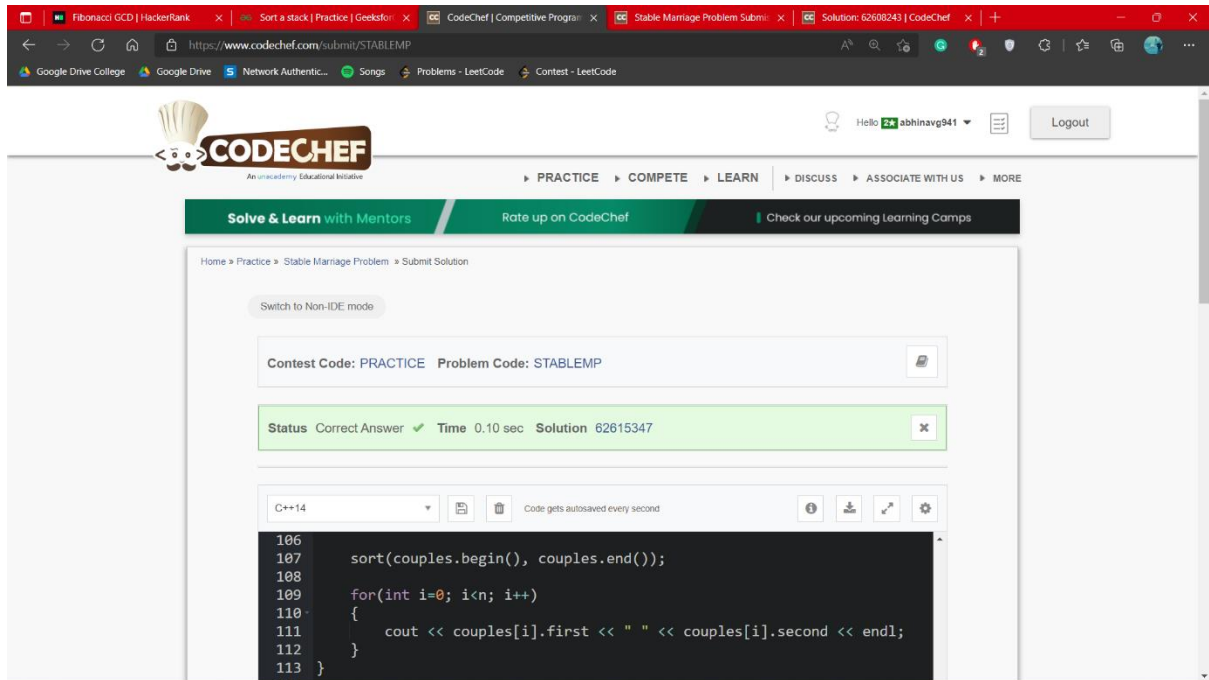
The code uses a priority queue to sort the stack. It first pushes all elements from the stack into the priority queue, then pops them back into the stack in sorted order.

Day 07 Task

Solve the stable marriage problem

<https://www.codechef.com/problems/STABLEMP>

Screenshot of submission:

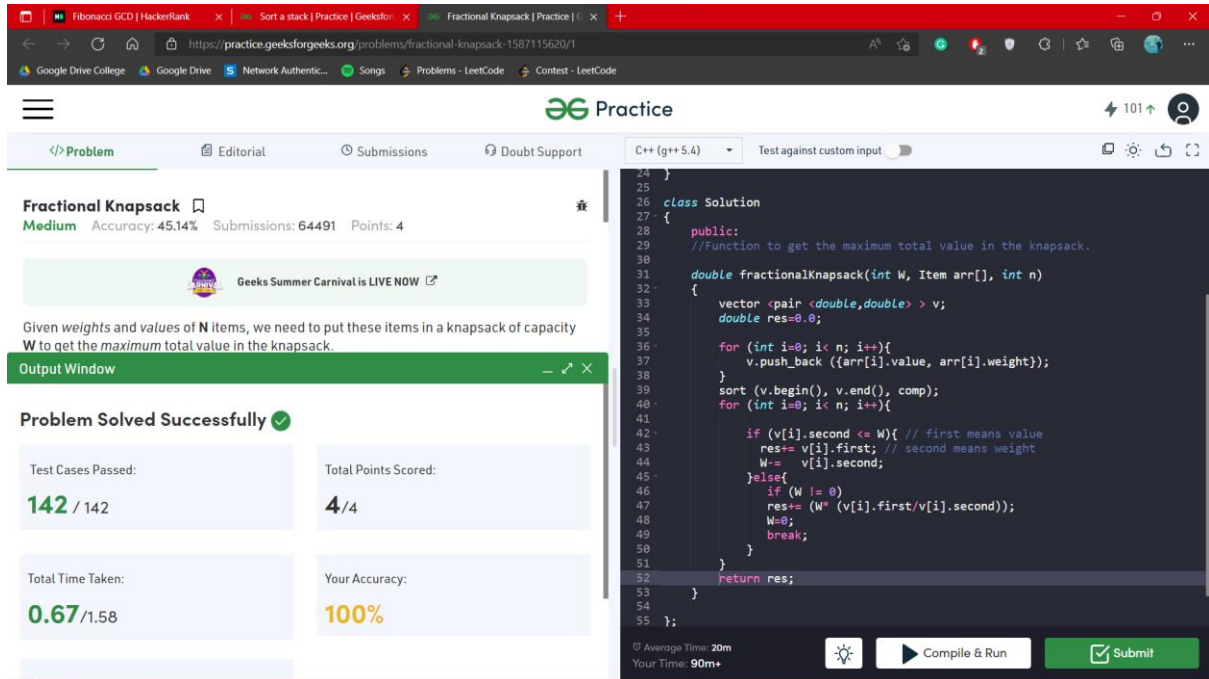


Day 08 Task

Solve the Fractional Knapsack problem

<https://practice.geeksforgeeks.org/problems/fractional-knapsack-1587115620/1>

Screenshot of submission:



The screenshot shows a web browser window displaying the 'Fractional Knapsack' problem on the GeeksforGeeks Practice platform. The problem is categorized as 'Medium' with an accuracy of 45.14%, 64491 submissions, and 4 points. A banner for 'Geeks Summer Carnival is LIVE NOW' is visible. The problem description states: 'Given weights and values of N items, we need to put these items in a knapsack of capacity W to get the maximum total value in the knapsack.' The 'Output Window' shows 'Problem Solved Successfully' with a green checkmark. Performance metrics are displayed: 'Test Cases Passed: 142 / 142', 'Total Points Scored: 4/4', 'Total Time Taken: 0.67 / 1.58', and 'Your Accuracy: 100%'. On the right, the C++ code for the solution is shown, implementing a greedy algorithm using a vector to store items sorted by value/weight ratio. The code includes a 'Solution' class with a 'fractionalKnapsack' method. At the bottom, there are buttons for 'Compile & Run' and 'Submit', along with timing information: 'Average Time: 20m' and 'Your Time: 90m+'.

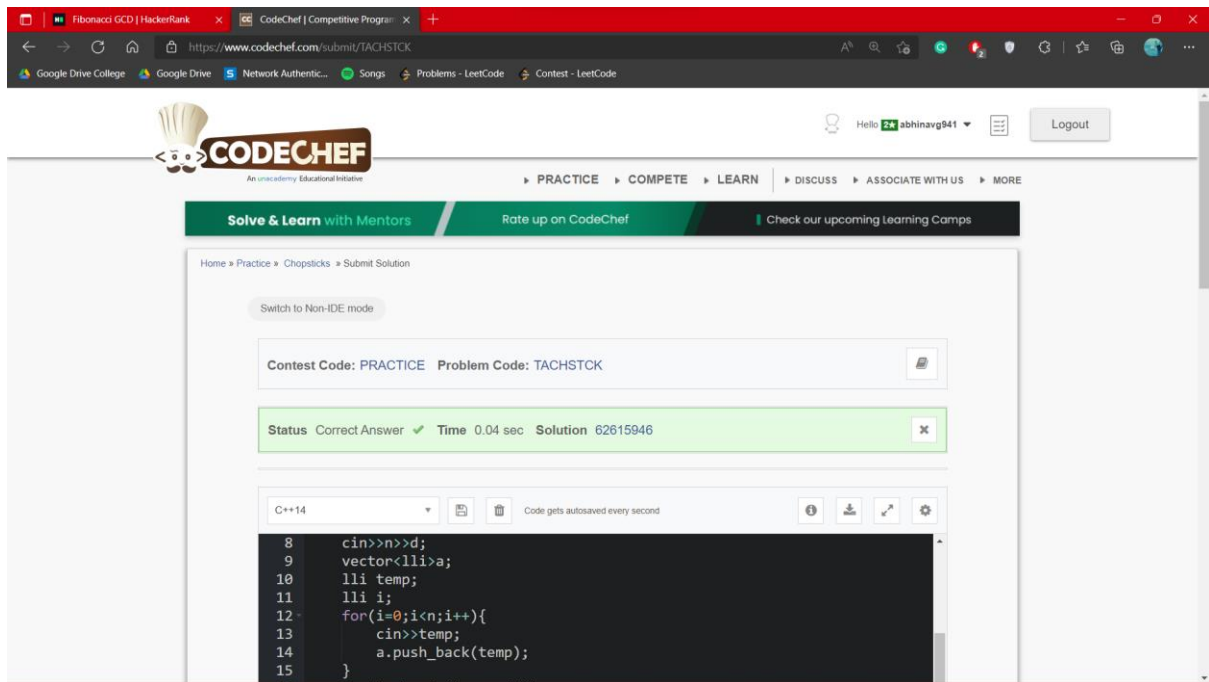
```
24 }
25
26 class Solution
27 {
28 public:
29 //Function to get the maximum total value in the knapsack.
30
31 double fractionalKnapsack(int W, Item arr[], int n)
32 {
33     vector<pair<double,double>> v;
34     double res=0.0;
35
36     for (int i=0; i< n; i++){
37         v.push_back ({arr[i].value, arr[i].weight});
38     }
39     sort (v.begin(), v.end(), comp);
40     for (int i=0; i< n; i++){
41
42         if (v[i].second <= W){ // first means value
43             res+= v[i].first; // second means weight
44             W-= v[i].second;
45         }else{
46             if (W != 0)
47                 res+= (W* (v[i].first/v[i].second));
48             W=0;
49             break;
50         }
51     }
52     return res;
53 }
54 }
55 };
```


Day 09 Task

Solve the Chopsticks problem

<https://www.codechef.com/problems/TACHSTCK>

Screenshot of submission:

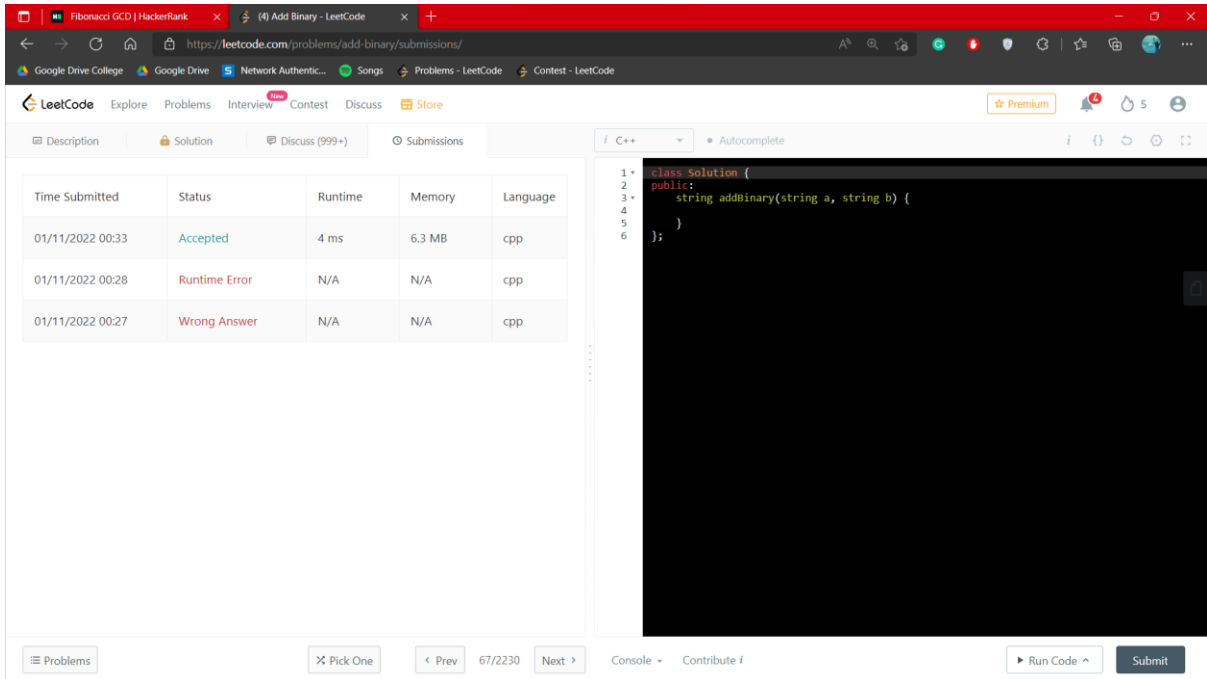


Day 10 Task

Solve the Add Binary problem

<https://leetcode.com/problems/add-binary/>

Screenshot of submission:



The screenshot shows a web browser window with the LeetCode website. The address bar displays <https://leetcode.com/problems/add-binary/submissions/>. The page features a navigation bar with links to Explore, Problems, Interview, Contest, Discuss, and Store. Below the navigation bar, there are tabs for Description, Solution, Discuss (999+), and Submissions. The Submissions tab is active, showing a table of submission history.

Time Submitted	Status	Runtime	Memory	Language
01/11/2022 00:33	Accepted	4 ms	6.3 MB	cpp
01/11/2022 00:28	Runtime Error	N/A	N/A	cpp
01/11/2022 00:27	Wrong Answer	N/A	N/A	cpp

To the right of the table is a code editor showing C++ code for the 'Add Binary' problem. The code is as follows:

```
1 class Solution {
2 public:
3     string addBinary(string a, string b) {
4
5     }
6 };
```

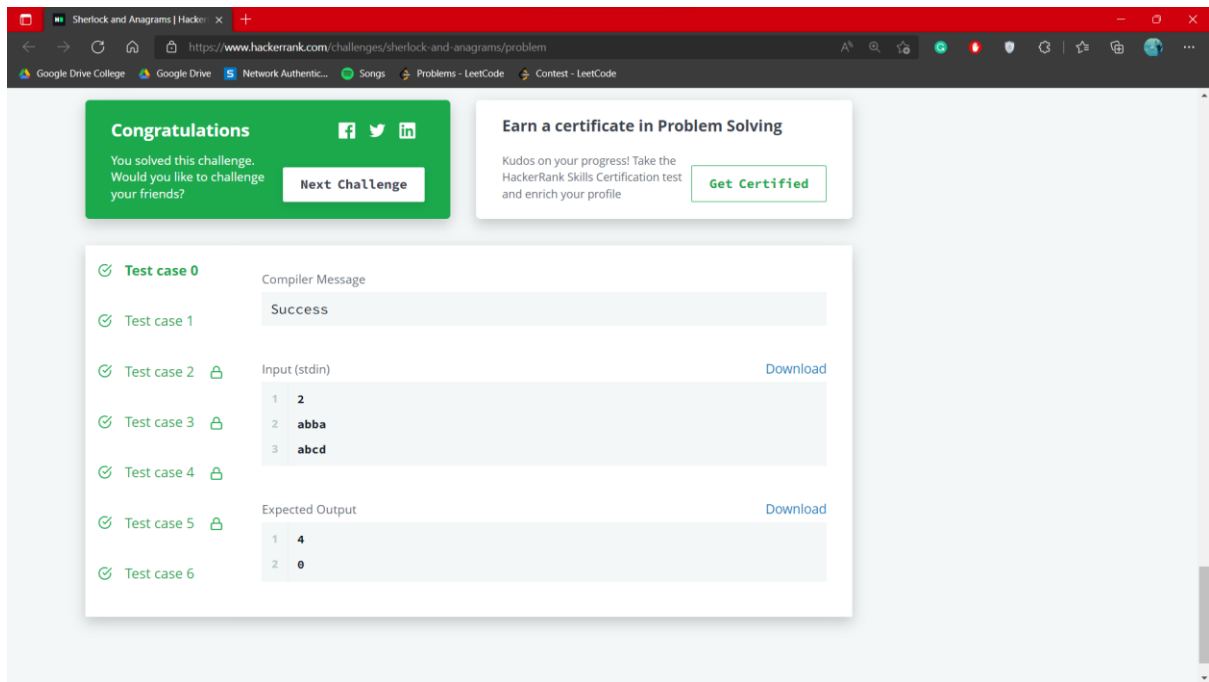
At the bottom of the page, there are buttons for 'Problems', 'Pick One', 'Prev', 'Next', 'Run Code', and 'Submit'.

Day 11 Task

Solve the Sherlock and Anagram problem

<https://www.hackerrank.com/challenges/sherlock-and-anagrams>

Screenshot of submission:

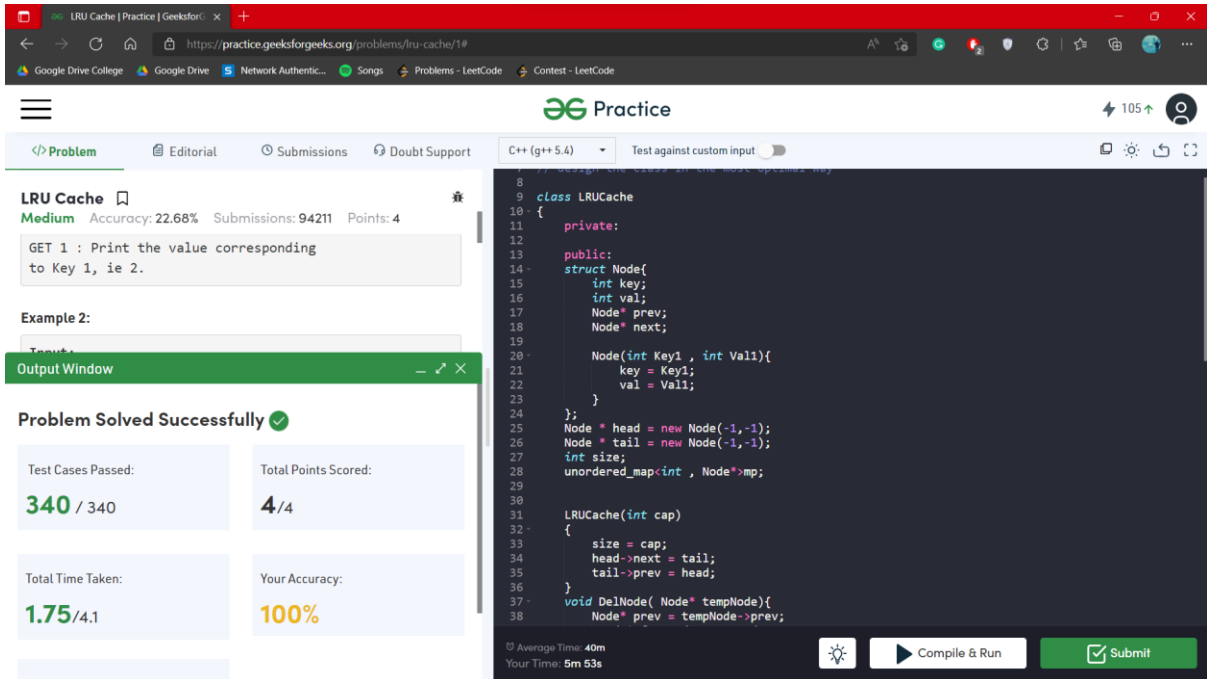


Day 12 Task

Solve the LRU Cache problem

<https://practice.geeksforgeeks.org/problems/lru-cache/1>

Screenshot of submission:



The screenshot shows a web browser window displaying the 'LRU Cache' problem on the GeeksforGeeks Practice platform. The problem is marked as 'Medium' with an accuracy of 22.68%, 94211 submissions, and 4 points. The problem description asks to print the value corresponding to a key. The user's C++ solution is shown in the editor, and the output window displays 'Problem Solved Successfully' with 340/340 test cases passed, 4/4 points scored, a total time taken of 1.75/4.1, and 100% accuracy. The code implements an LRU Cache using a doubly linked list and an unordered map.

```
8 // Design the class of the most optimal way
9
10 class LRUCache
11 {
12 private:
13 public:
14     struct Node{
15         int key;
16         int val;
17         Node* prev;
18         Node* next;
19     };
20     Node(int Key1 , int Val1){
21         key = Key1;
22         val = Val1;
23     }
24 };
25 Node * head = new Node(-1,-1);
26 Node * tail = new Node(-1,-1);
27 int size;
28 unordered_map<int , Node*>mp;
29
30 LRUCache(int cap)
31 {
32     size = cap;
33     head->next = tail;
34     tail->prev = head;
35 }
36
37 void DelNode( Node* tempNode){
38     Node* prev = tempNode->prev;
```

Test Cases Passed: 340 / 340
Total Points Scored: 4/4
Total Time Taken: 1.75/4.1
Your Accuracy: 100%

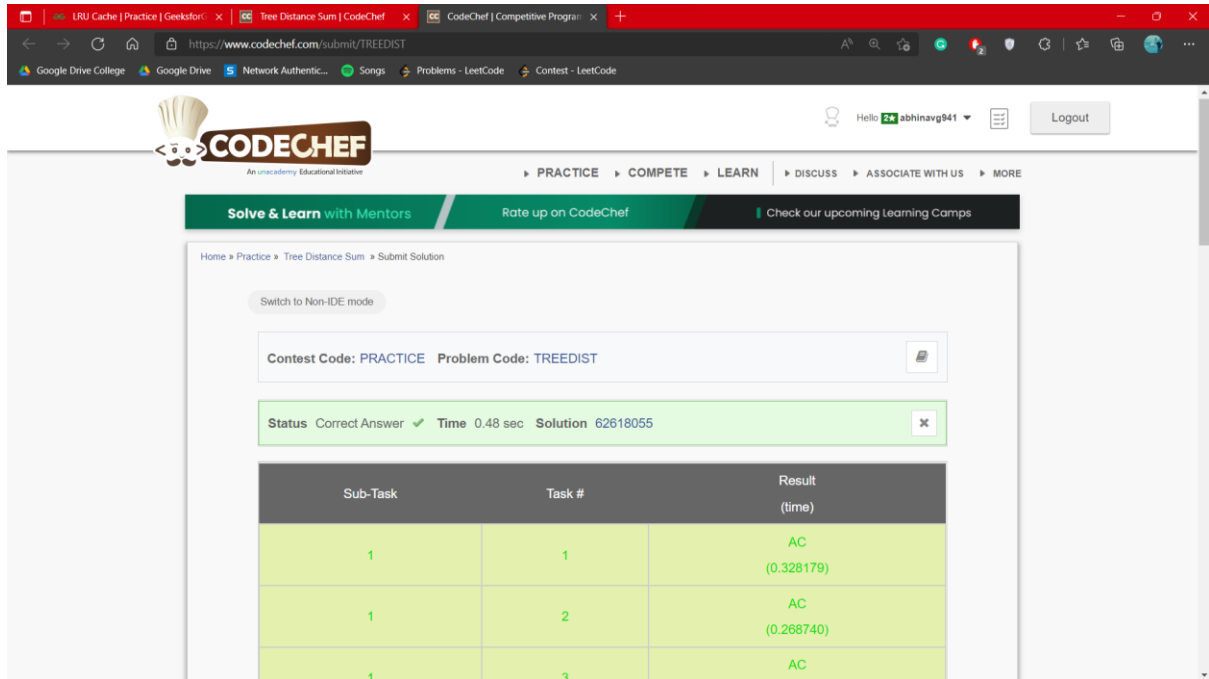
Average Time: 40m
Your Time: 5m 53s
Compile & Run
Submit

Day 13 Task

Solve the Tree Distance Sum problem

<https://www.codechef.com/problems/TREEDIST>

Screenshot of submission:



The screenshot shows the CodeChef submission page for the problem 'Tree Distance Sum' (TREEDIST). The user is logged in as 'abhinavg941'. The submission status is 'Correct Answer' with a time of 0.48 sec and a solution ID of 62618055. A table below shows the results for three sub-tasks, all of which were solved successfully (AC).

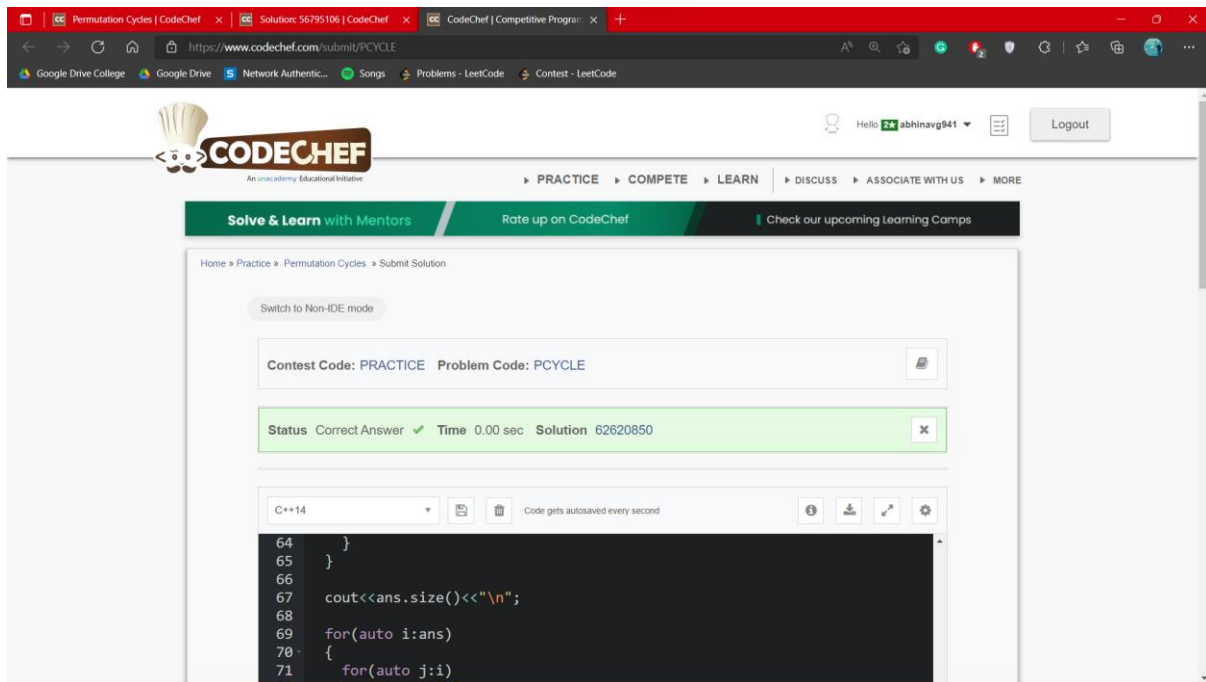
Sub-Task	Task #	Result (time)
1	1	AC (0.328179)
1	2	AC (0.268740)
1	3	AC

Day 14 Task

Solve the Permutations Cycle problem

<https://www.codechef.com/problems/PCYCLE>

Screenshot of submission:

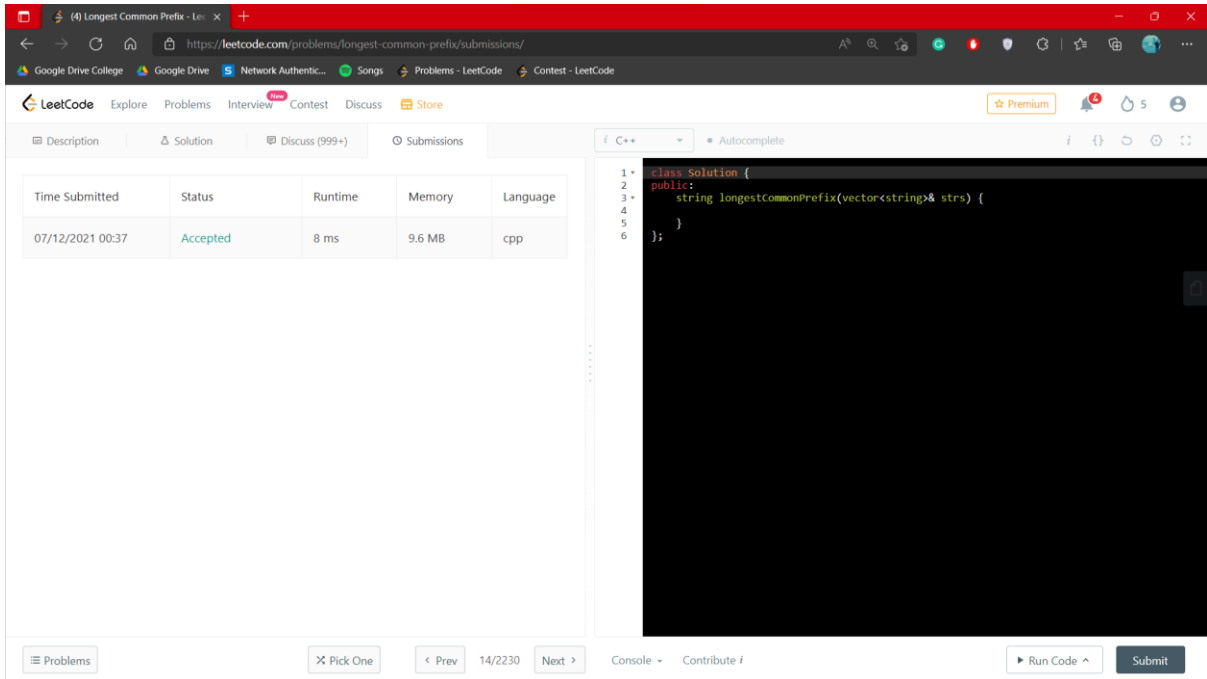


Day 15 Task

Solve the Longest Common Prefix problem

<https://leetcode.com/problems/longest-common-prefix/>

Screenshot of submission:



The screenshot shows a web browser window displaying the LeetCode submission page for the "Longest Common Prefix" problem. The submission is successful, with a status of "Accepted". The code is written in C++ and is as follows:

```
1 class Solution {
2 public:
3     string longestCommonPrefix(vector<string>& strs) {
4     }
5 };
```

The submission details table is as follows:

Time Submitted	Status	Runtime	Memory	Language
07/12/2021 00:37	Accepted	8 ms	9.6 MB	cpp

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