Experiment-1.4

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Subject Name: CC LAB **Subject Code: 20CSP-351**

Aim:

To demonstrate the concept of Hashing

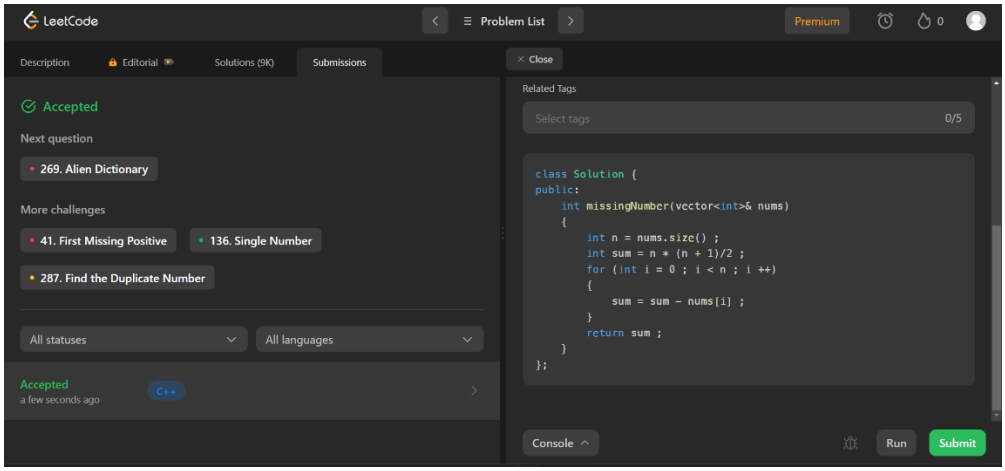
Objective

Problem 1:
Missing number

Code:

```
class Solution {
public:
    int missingNumber(vector<int>& nums)
    {
        int n = nums.size() ;
        int sum = n * (n + 1)/2 ;
        for (int i = 0 ; i < n ; i ++)
        {
            sum = sum - nums[i] ;
        }
        return sum ;
    }
};
```

Output:



Problem 2:

Longest Duplicate substring

Code:

```
#define ull unsigned long long
class Solution {
public:
    string ans="";
    bool solve(int len, string &s, ull power){
        int start = 0, end = len;
        unordered_set<ull> st;
        ull curHash = 0;
        for(int i=0; i<len; ++i){
            curHash = (curHash*131 + (s[i]));
        }
        st.insert(curHash);
        for(int j=len; j<s.size(); ++j){
            curHash = ((curHash - power*(s[start]))) ;
```

```
            curHash = (curHash*131);
            curHash = (curHash + (s[j]));
            start++;
            if(st.find(curHash) != st.end()){
                string curS = s.substr(start,len);
                if(curS.size()>ans.size()){
                    ans = curS;
                }
                return true;
            }
            st.insert(curHash);
        }
        return false;
    }
    void binary(int l, int r, string &s, vector<ull>& power){
        if(l>r) return;
        int mid = l+(r-l)/2;
        if(solve(mid+1,s,power[mid])){
            l=mid+1;
        }else{
            r=mid-1;
        }
        binary(l,r,s,power);
    }
    string longestDupSubstring(string s) {
        int n = s.size();
```

```
        vector<ull> power(n,1);
        for(int i=1;i<n;++i){
            power[i]=(power[i-1]*131);
        }
        binary(0,n-1,s,power);
        return ans;
    }
};
```

Output: