WORKSHEET 4

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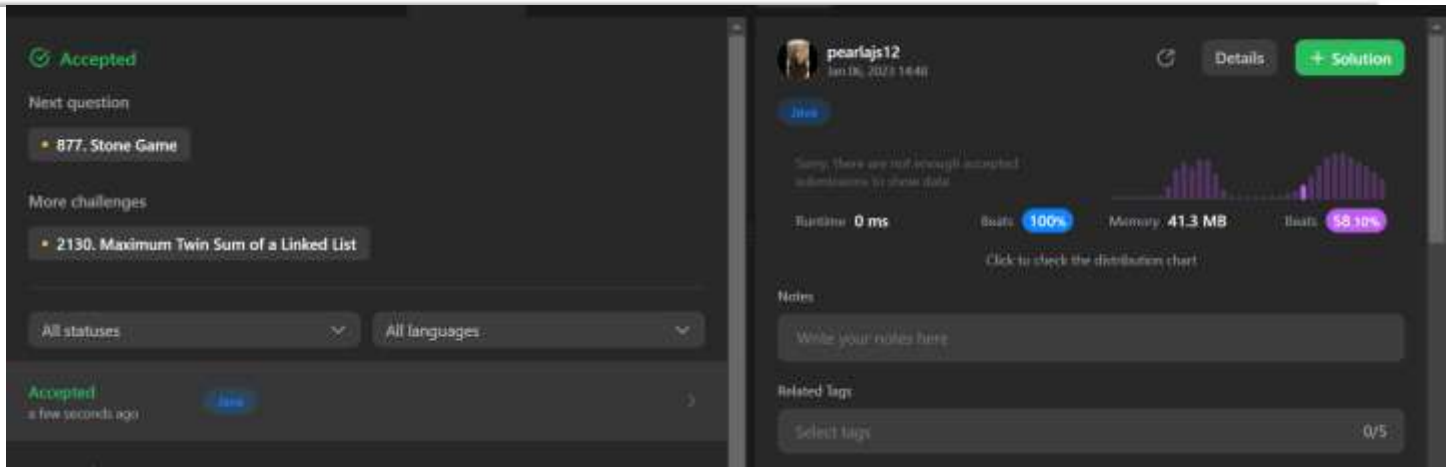
Q1) ADD TWO NUMBERS
https://leetcode.com/problems/add-two-numbers/description/

```
class Solution {
public ListNode addTwoNumbers(ListNode l1, ListNode l2) {
        ListNode ll1=l1;
        ListNode ll2=l2;
      ListNode dummy=new ListNode(0);
    ListNode d=new ListNode();
    d=dummy;

    int carry=0;
    while(ll1!=null || ll2!=null)
    {

        int x = (ll1 != null) ? ll1.val : 0;
        int y = (ll2 != null) ? ll2.val : 0;
        int sum = carry + x + y;
        d.next=new ListNode(sum%10);
        carry=sum/10;
        if(ll1 != null)
            ll1=ll1.next;
         if(ll2 != null)
        ll2=ll2.next;
        d=d.next;
    }
     if (carry > 0) {
        d.next = new ListNode(carry);
    }
    return dummy.next;

    }
};
```



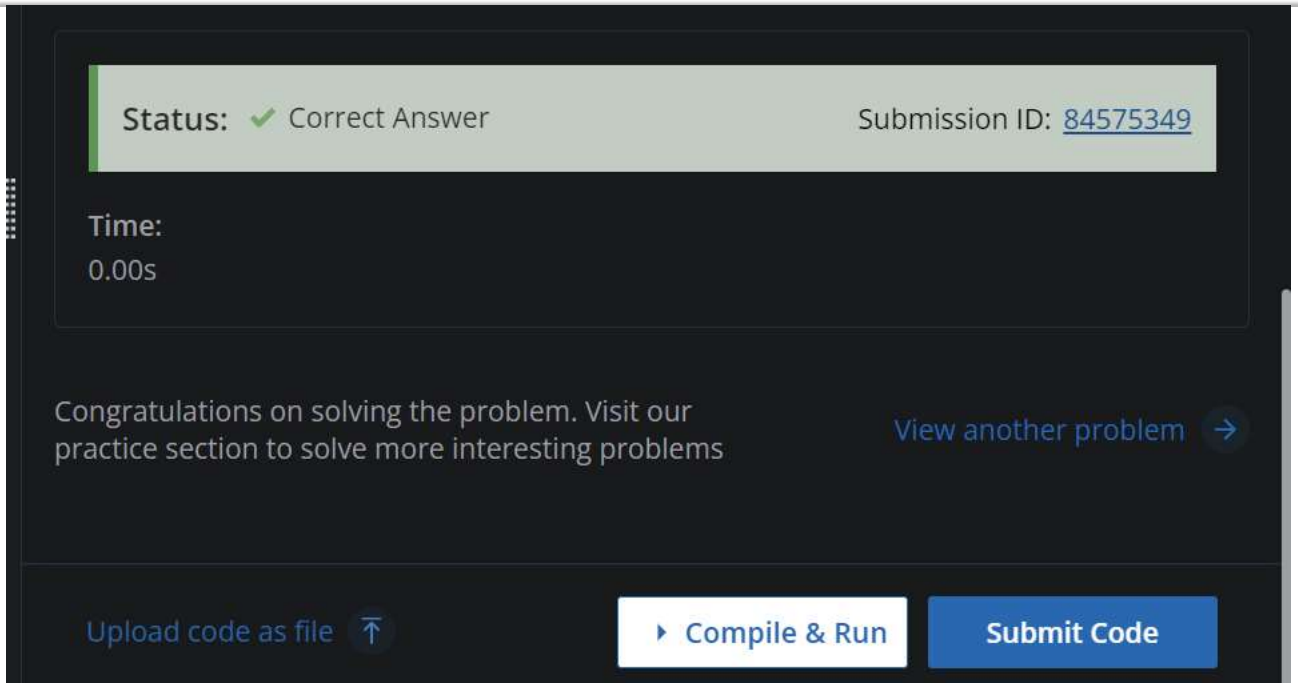
Q2) Palindrome Linked List

```
class Solution
{
  ListNode getMid(ListNode head) {
        ListNode slow = head, fast = head;
        while (fast != null) {
            slow = slow.next;
            fast = fast.next == null ? null : fast.next.next;
        }
        return slow;
    }

    ListNode reverse(ListNode head) {
        ListNode prev = null, curr = head, next = head.next;
        while (curr != null) {
            curr.next = prev;
            prev = curr;
            curr = next;
            if (next != null)
                next = next.next;
        }
        return prev;
    }

    boolean isPalindrome(ListNode head) {
        if (head == null) return false;
        ListNode mid = getMid(head);
        if (mid != null) // this is to handle when there is only 1 element
            mid = reverse(mid);
        ListNode pointer_1 = head, pointer_2 = mid;
        while (pointer_1 != null && pointer_2 != null) {
            if (pointer_1.val != pointer_2.val)
                return false;
            pointer_1 = pointer_1.next;
            pointer_2 = pointer_2.next;
        }
```

```
                return true;
        }
}
```

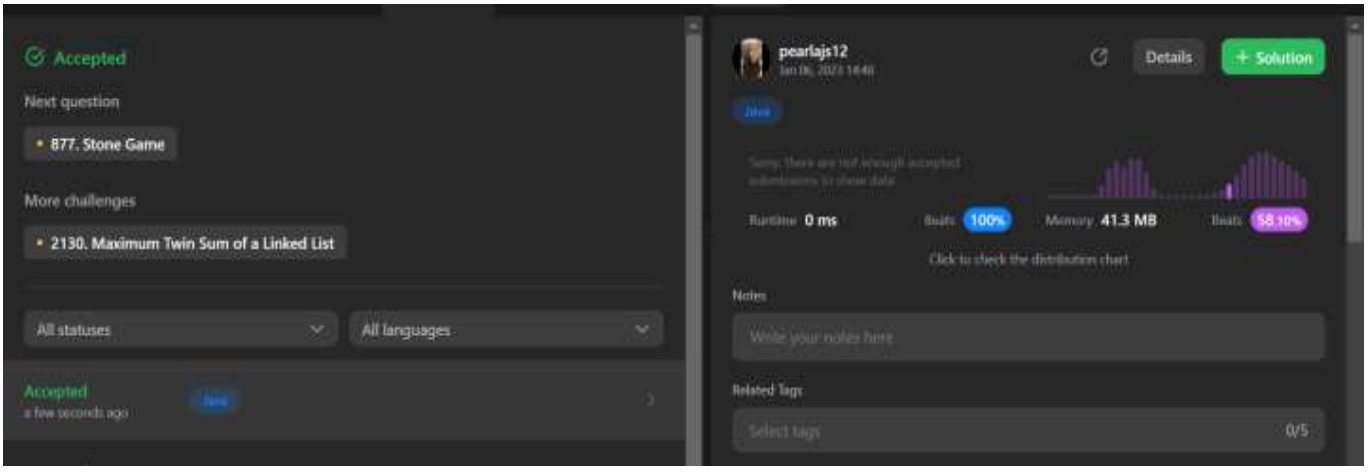
Q3) TEMPLE LAND
Ans)

```
#include <bits/stdc++.h>
using namespace std;

int main() {
        // SAURABH
        int t;
        cin>>t;
        while(t--){
            int n;
            cin>>n;
            vector<int>a(n);
            for(auto &i:a)cin>>i;

            if(n&1){
                bool flag=1;
              for(int i=0;i<=n/2;i++){
                  if(i+1!=a[i])flag=0;
              }
              for(int i=n/2+1;i<n;i++){
                  if(n-i!=a[i])
                  flag=0;
              }
              cout<<(flag?"yes":"no")<<'\n';
            }
            else cout<<"no\n";
        }
        return 0;
}
```



Q4) MIDDLE OF LINKED LIST

```
class Solution {
    public ListNode middleNode(ListNode head) {
       ListNode slow = head, fast = head;
        while (fast != null && fast.next != null) {
            slow = slow.next;
            fast = fast.next.next;
        }
        return slow;
    }
}
```



Q5) https://leetcode.com/problems/sort-list/

SORT LIST

```
class Solution {
    public ListNode sortList(ListNode head) {
        if (head == null || head.next == null)
            return head;
        ListNode mid = getMid(head);
        ListNode left = sortList(head);
        ListNode right = sortList(mid);
        return merge(left, right);
    }

    ListNode merge(ListNode list1, ListNode list2) {
      if (list1 == null) {
            return list2;
        }
        if (list2 == null) {
            return list1;
        }
        ListNode head1=list1;
        ListNode head2=list2;

        ListNode dummy;
        ListNode head3;


        //choosing the head which is smaller :)
            if(head1.val<head2.val)
            {

                head3=dummy=new ListNode(head1.val);
                head1=head1.next;
            }
            else{
                head3=dummy=new ListNode(head2.val);
                head2=head2.next;
            }


        // Loop until any of the list becomes null
        while (head1 != null && head2 != null) {
            if (head1.val < head2.val) {
                head3.next = new ListNode(head1.val);
                head1 = head1.next;
            } else {
               head3.next = new ListNode(head2.val);
                head2 = head2.next;
            }
            head3=head3.next;
```

```
        }



        while(head1!=null)
        {

                head3.next=new ListNode(head1.val);
                head1=head1.next;
              head3=head3.next;
        }
        while(head2!=null)
        {
             head3.next=new ListNode(head2.val);
                head2=head2.next;
            head3=head3.next;
        }

       return dummy;
    }
    ListNode getMid(ListNode head) {
        ListNode midPrev = null;
        while (head != null && head.next != null) {
            midPrev = (midPrev == null) ? head : midPrev.next;
            head = head.next.next;
        }
        ListNode mid = midPrev.next;
        midPrev.next = null;
        return mid;
    }
}
```