Worksheet - 4

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Subject Name: Competitive Coding **Section/Group:** 20BCS_WM-703/B

Task-1: Find the merge point of two joined linked list

https://www.hackerrank.com/challenges/find-the-merge-point-of-two-joined-linked-lists/problem?isFullScreen=true

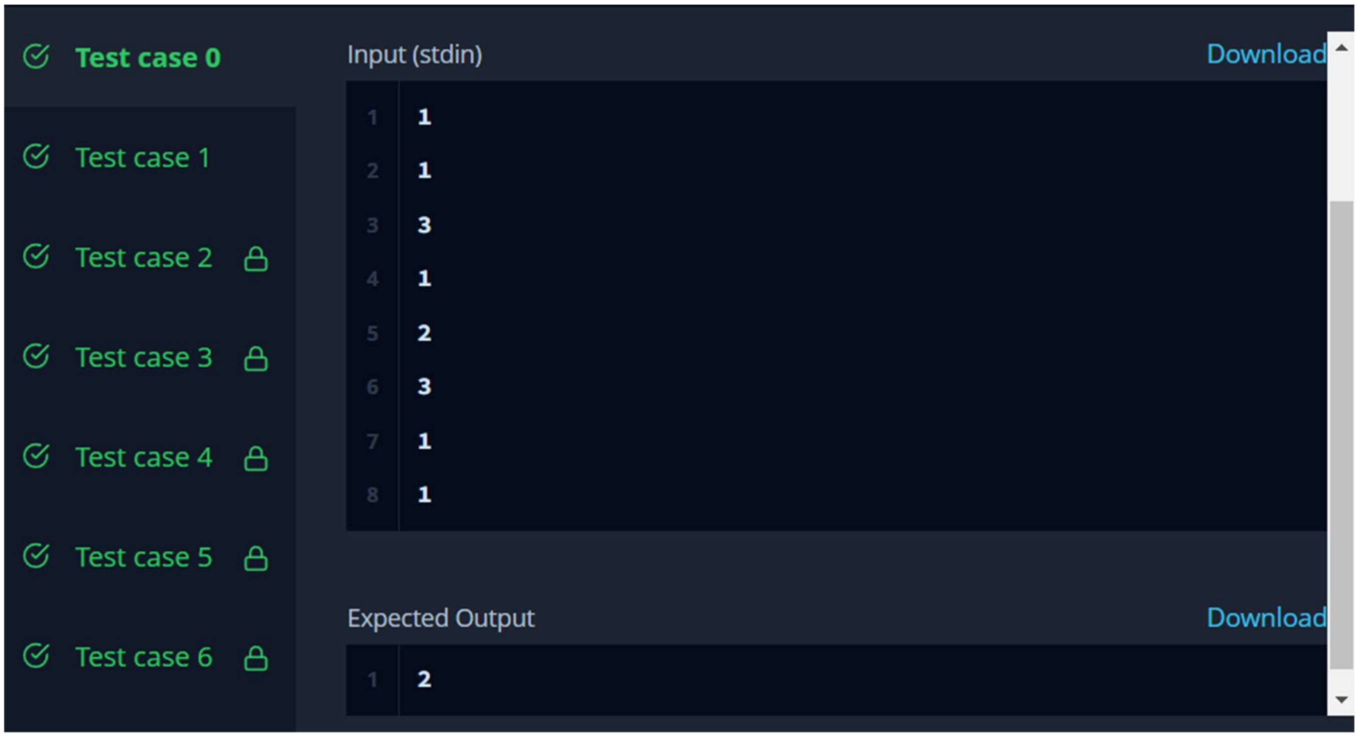
Code:

```
#include<cstdio>

char M[25][25];
int T[25][25][2];
double P[2][25][25];

const int D[4][2] = {{-1,0}, {1, 0}, {0,-1}, {0,1}};
int h,w,t;

void calc(int in, int out) {
    for(int x=0;x<w;x++)
        for(int y=0;y<h;y++) {
            if(M[y][x] == '*' || M[y][x] == '#')
                P[out][y][x] = 0.0;
            if(M[y][x] == '%')
                P[out][y][x] = 1.0;
            if(M[y][x] == 'O' || M[y][x] == 'A') {
                int count = 0; double suma = 0.0;
                int px=x, py=y;
                if(T[y][x][0] != -1) {px = T[y][x][0]; py = T[y][x][1];}
                for(int i=0;i<4;i++) {
                    int x2 = px+D[i][0], y2 = py + D[i][1];
                    if(x2 < 0 || x2 >= w || y2 < 0 || y2 >= h)continue;
                    if(M[y2][x2] == '#')continue;
                    suma += P[in][y2][x2];
                    count++;
                }
                if(count == 0)
                    P[out][y][x] = 0.0;
                else P[out][y][x] = suma / count;
            }
        }
}

double get_ans(int p) {
    for(int i=0;i<h;i++)
        for(int j=0;j<w;j++)
            if(M[i][j] == 'A')
                return P[p%2][i][j];
    return -1.0;
}

int main() {
    scanf("%d%d%d", &h, &w, &t);

    for(int i=0;i<h;i++)
        scanf("%s", M[i]);

    for(int i=0;i<h;i++)
        for(int j=0;j<w;j++)
            T[i][j][0] = T[i][j][1] = -1;

    for(int i=0;i<t;i++){
        int x0, y0, x1, y1;
        scanf("%d%d%d%d", &y0, &x0, &y1, &x1);
        x0--;y0--;x1--;y1--;#include <bits/stdc++.h>

using namespace std;
```

```
class SinglyLinkedListNode {
    public:
        int data;
        SinglyLinkedListNode *next;

        SinglyLinkedListNode(int node_data) {
            this->data = node_data;
            this->next = nullptr;
        }
};

class SinglyLinkedList {
    public:
        SinglyLinkedListNode *head;
        SinglyLinkedListNode *tail;

        SinglyLinkedList() {
            this->head = nullptr;
            this->tail = nullptr;
        }

        void insert_node(int node_data) {
            SinglyLinkedListNode* node = new SinglyLinkedListNode(node_data);

            if (!this->head) {
                this->head = node;
            } else {
                this->tail->next = node;
            }

            this->tail = node;
        }
};

void print_singly_linked_list(SinglyLinkedListNode* node, string sep, ofstream& fout) {
    while (node) {
        fout << node->data;
        node = node->next;

        if (node) {
            fout << sep;
        }
    }
}

void free_singly_linked_list(SinglyLinkedListNode* node) {
    while (node) {
        SinglyLinkedListNode* temp = node;
        node = node->next;

        free(temp);
    }
}

int findMergeNode(SinglyLinkedListNode* headA, SinglyLinkedListNode* headB) {
    while(headA){
        SinglyLinkedListNode *tmp = headA->next;
        headA->next = NULL;
        headA = tmp;
    }

    while(headB){
        if(headB->next == NULL){
            return headB->data;
        }
        headB = headB->next;
    }
    return 0;
}

int main()
{
    ofstream fout(getenv("OUTPUT_PATH"));

    int tests;
    cin >> tests;
```

```
cin.ignore(numeric_limits<streamsize>::max(), '\n');

for (int tests_itr = 0; tests_itr < tests; tests_itr++) {
    int index;
    cin >> index;
    cin.ignore(numeric_limits<streamsize>::max(), '\n');

    SinglyLinkedList* llist1 = new SinglyLinkedList();

    int llist1_count;
    cin >> llist1_count;
    cin.ignore(numeric_limits<streamsize>::max(), '\n');

    for (int i = 0; i < llist1_count; i++) {
        int llist1_item;
        cin >> llist1_item;
        cin.ignore(numeric_limits<streamsize>::max(), '\n');

        llist1->insert_node(llist1_item);
    }

    SinglyLinkedList* llist2 = new SinglyLinkedList();

    int llist2_count;
    cin >> llist2_count;
    cin.ignore(numeric_limits<streamsize>::max(), '\n');

    for (int i = 0; i < llist2_count; i++) {
        int llist2_item;
        cin >> llist2_item;
        cin.ignore(numeric_limits<streamsize>::max(), '\n');

        llist2->insert_node(llist2_item);
    }

    SinglyLinkedListNode* ptr1 = llist1->head;
    SinglyLinkedListNode* ptr2 = llist2->head;

    for (int i = 0; i < llist1_count; i++) {
            if (i < index) {
                ptr1 = ptr1->next;
            }
        }

        for (int i = 0; i < llist2_count; i++) {
            if (i != llist2_count-1) {
                ptr2 = ptr2->next;
            }
        }

        ptr2->next = ptr1;

        int result = findMergeNode(llist1->head, llist2->head);

        fout << result << "\n";
    }

    fout.close();

    return 0;
}
        T[y0][x0][0] = x1;
        T[y0][x0][1] = y1;
        T[y1][x1][0] = x0;
        T[y1][x1][1] = y0;
    }

    const int limit = 80000;

    for(int i=0;i<limit;i++) {
        calc(i%2, (i+1)%2);
    }
    printf("%lf\n", get_ans(limit));


}
```

Hacker Rank Test Case / Output:



Input (stdin)

```
1
1
3
1
2
3
1
1
```

Expected Output

```
2
```

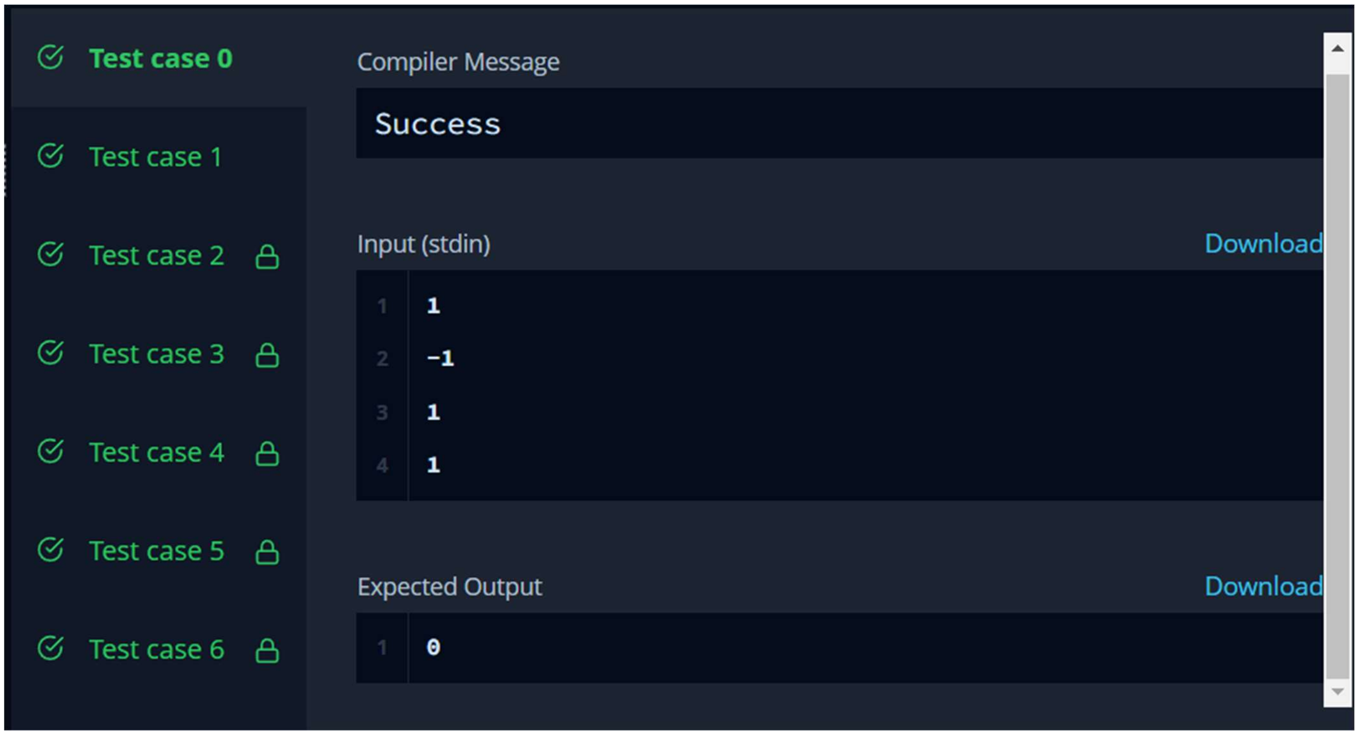
Task-2: Whether a linked list contains a cycle

https://www.hackerrank.com/challenges/detect-whether-a-linked-list-contains-a-cycle/problem?isFullScreen=true

Code:

```
#include <bits/stdc++.h>

using namespace std;

class SinglyLinkedListNode {
    public:
        int data;
        SinglyLinkedListNode *next;

        SinglyLinkedListNode(int node_data) {
            this->data = node_data;
            this->next = nullptr;
        }
};

class SinglyLinkedList {
    public:
        SinglyLinkedListNode *head;
        SinglyLinkedListNode *tail;

        SinglyLinkedList() {
            this->head = nullptr;
            this->tail = nullptr;
        }

        void insert_node(int node_data) {
            SinglyLinkedListNode* node = new SinglyLinkedListNode(node_data);

            if (!this->head) {
                this->head = node;
            } else {
                this->tail->next = node;
            }

            this->tail = node;
        }
};

void print_singly_linked_list(SinglyLinkedListNode* node, string sep, ofstream& fout) {
    while (node) {
        fout << node->data;

        node = node->next;

        if (node) {
            fout << sep;
        }
    }
}

void free_singly_linked_list(SinglyLinkedListNode* node) {
    while (node) {
        SinglyLinkedListNode* temp = node;
        node = node->next;

        free(temp);
    }
}


bool has_cycle(SinglyLinkedListNode* head) {
SinglyLinkedListNode* cur1 = head;
    SinglyLinkedListNode* cur2 = head;
    int result = 0;
    while (cur1 && cur2)
    {
        cur1 = cur1->next;
        cur2 = cur2->next;
        if (cur2)
        {
            cur2 = cur2->next;
        }

        if (cur1 == cur2)
        {
            result = 1;
            break;
        }
    }
    return result;

}

int main()
{
    ofstream fout(getenv("OUTPUT_PATH"));

    int tests;
    cin >> tests;
    cin.ignore(numeric_limits<streamsize>::max(), '\n');

    for (int tests_itr = 0; tests_itr < tests; tests_itr++) {
        int index;
        cin >> index;
        cin.ignore(numeric_limits<streamsize>::max(), '\n');

        SinglyLinkedList* llist = new SinglyLinkedList();

        int llist_count;
        cin >> llist_count;
        cin.ignore(numeric_limits<streamsize>::max(), '\n');

        for (int i = 0; i < llist_count; i++) {
            int llist_item;
            cin >> llist_item;
            cin.ignore(numeric_limits<streamsize>::max(), '\n');

            llist->insert_node(llist_item);
        }
        SinglyLinkedListNode* extra = new SinglyLinkedListNode(-1);
        SinglyLinkedListNode* temp = llist->head;

        for (int i = 0; i < llist_count; i++) {
            if (i == index) {
                extra = temp;
            }

            if (i != llist_count-1) {
                temp = temp->next;
            }
        }

        temp->next = extra;

        bool result = has_cycle(llist->head);

        fout << result << "\n";
    }

    fout.close();

    return 0;
}
```

Hacker Rank Test Case / Output:



Compiler Message

```
Success
```

Input (stdin)

```
1
-1
1
1
```

Expected Output

```
0
```