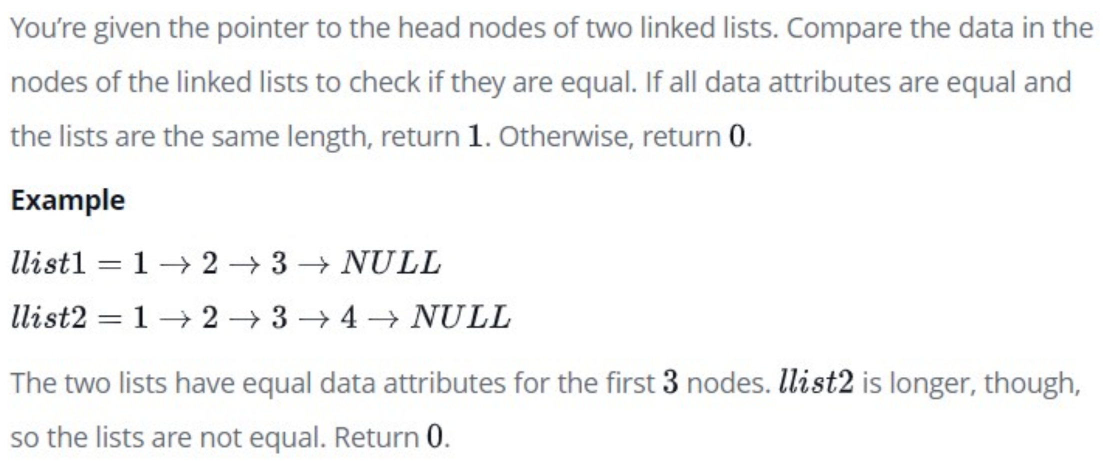
Experiment – 1.3

1. Compare two linked lists



You're given the pointer to the head nodes of two linked lists. Compare the data in the nodes of the linked lists to check if they are equal. If all data attributes are equal and the lists are the same length, return 1. Otherwise, return 0.

Example

$llist1 = 1 \rightarrow 2 \rightarrow 3 \rightarrow NULL$

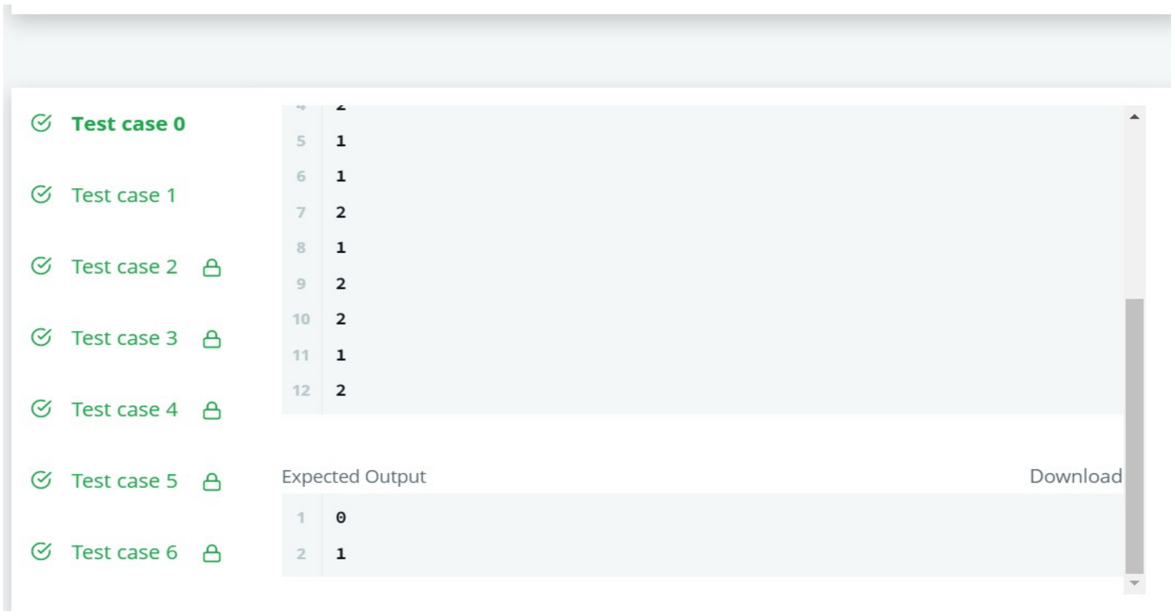
$llist2 = 1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow NULL$

The two lists have equal data attributes for the first 3 nodes. $llist2$ is longer, though, so the lists are not equal. Return 0.

```
#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 compare_lists(SinglyLinkedListNode* head1,
SinglyLinkedListN ode* head2) {     int res=1;     while(head1 !=
NULL || head2 != NULL){         if(head1 == NULL) {res=0; break;}
if(head2 == NULL) {res=0; break;}         if(head1->data !=
head2->data){res=0;break;}         head1=head1->next;
head2=head2->next;
    }
return res;
}
// UID: 20BCS9364
\\Aman Bharti
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++)
{
        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);
        }          bool result = compare_lists(llist1->head,
llist2->head);

        fout << result << "\n";
    }
    fout.close();
     return
0; }
```



Test case 0

Test case 1

Test case 2

Test case 3

Test case 4

Test case 5

Test case 6

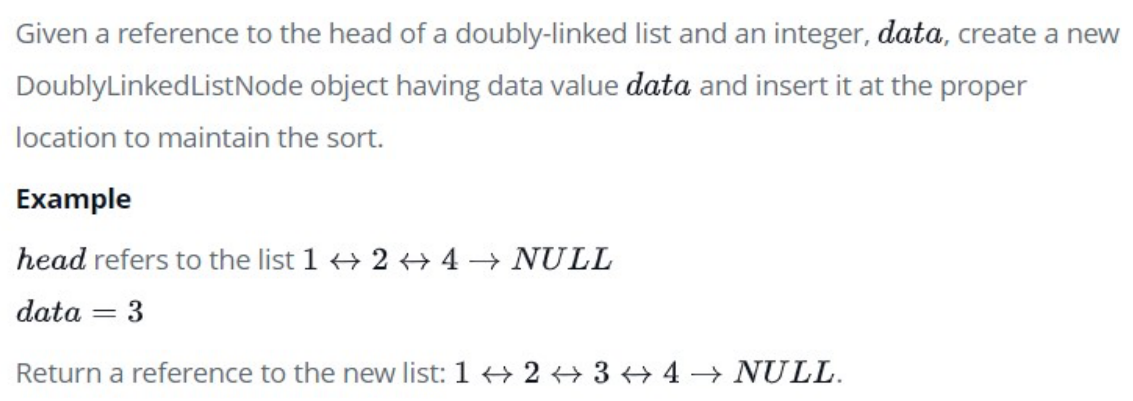
```
1
1
2
1
2
2
1
2
```

Expected Output

Download

```
0
1
```

2. Inserting a Node Into a Sorted Doubly Linked List


Given a reference to the head of a doubly-linked list and an integer, $data$, create a new DoublyLinkedListNode object having data value $data$ and insert it at the proper location to maintain the sort.

Example

$head$ refers to the list $1 \leftrightarrow 2 \leftrightarrow 4 \rightarrow NULL$

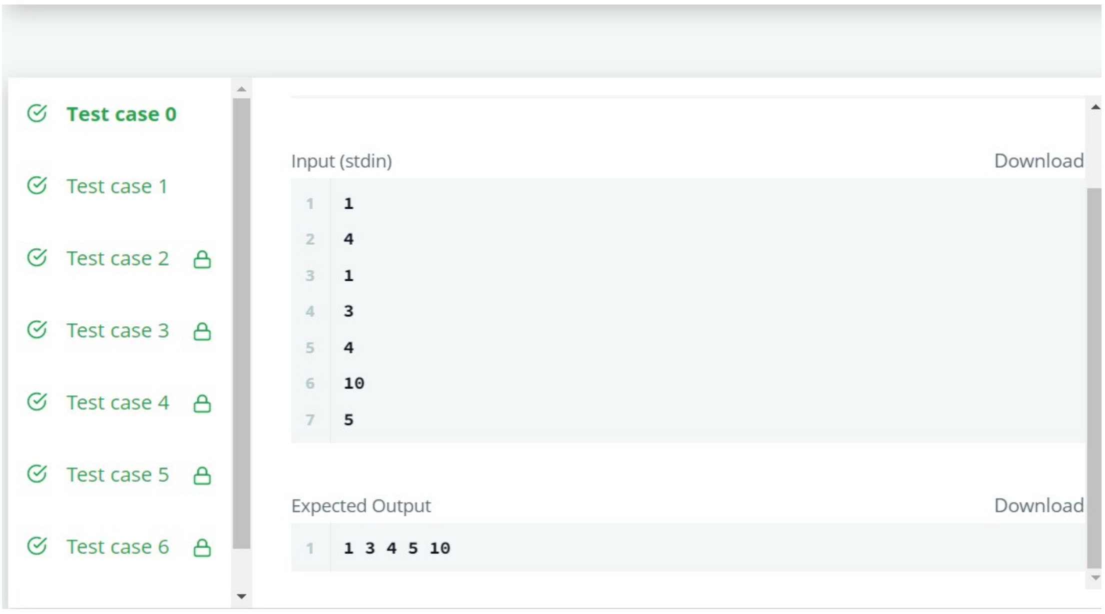
$data = 3$

Return a reference to the new list: $1 \leftrightarrow 2 \leftrightarrow 3 \leftrightarrow 4 \rightarrow NULL$.

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

class DoublyLinkedListNode {
public:
        int data;
        DoublyLinkedListNode *next;
        DoublyLinkedListNode *prev;

        DoublyLinkedListNode(int node_data) {
this->data = node_data;              this-
>next = nullptr;             this->prev =
nullptr;
        }
};  class
DoublyLinkedList {
public:
        DoublyLinkedListNode *head;
        DoublyLinkedListNode *tail;

        DoublyLinkedList()      {
this->head        =       nullptr;
this->tail = nullptr;
        }          void insert_node(int
node_data) {
            DoublyLinkedListNode* node = new DoublyLinkedListNode(no
de_data);
            if (!this->head) {
this->head = node;              } else {
                this->tail->next = node;
node->prev = this->tail;
```

```
              }
               this->tail =
node;
        }
};  void print_doubly_linked_list(DoublyLinkedListNode* node, string
sep
, ofstream& fout) {    while
(node)  {            fout  <<
node->data;
         node = node-
>next;

        if (node) {
fout << sep;
        }
    }
}
void free_doubly_linked_list(DoublyLinkedListNode* node) {
while (node) {
        DoublyLinkedListNode* temp = node;
node = node->next;

free(temp);
    }
}

DoublyLinkedListNode* sortedInsert(DoublyLinkedListNode* head, int d
ata) {

  DoublyLinkedListNode* node = new DoublyLinkedListNode(data);
     node->data =
data;
  node->next = node->prev = NULL;

if(head==NULL)
return node;

 if(head->data > data){
head->prev    =    node;
node->next    =    head;
return node;
 }

 DoublyLinkedListNode* next = sortedInsert(head->next, data);
head->next = next;  next->prev = head;  return head;
```

```
}
// UID: 20BCS9364
// Aman Bharti
int main() {
    ofstream fout(getenv("OUTPUT_PATH"));
     int     t;                            cin     >>     t;
cin.ignore(numeric_limits<streamsize>::max(), '\n');

    for (int t_itr = 0; t_itr < t; t_itr++) {
        DoublyLinkedList* llist = new DoublyLinkedList();

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

        DoublyLinkedListNode* llist1 = sortedInsert(llist-
>head, data);
         print_doubly_linked_list(llist1,    "    ",
fout);          fout << "\n";

free_doubly_linked_list(llist1);     }

    fout.close();

    return 0;
}
```



Input (stdin)

```
1
4
1
3
4
10
5
```

Expected Output

```
1 3 4 5 10
```