

## EXPERIMENT-3

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**Semester:** 6<sup>th</sup>

**Subject Code:** 22ITP-351

### PROBLEM-1

#### AIM:-

Print linked list

#### CODE:-

```
class Node {
    int data;
    Node next;
    Node(int data) {
        this.data = data;
        this.next = null;
    }
}

class Solution {
    void printList(Node head) {
        Node temp = head;
        while (temp != null) {
            System.out.print(temp.data + " ");
            temp = temp.next;
        }
        System.out.println();
    }
}

public class Main {
    public static void main(String[] args) {
        Node head = new Node(49);
        head.next = new Node(10);
        head.next.next = new Node(30);

        Solution sol = new Solution();
        sol.printList(head);
    }
}
```

**OUTPUT:-**



Output Window

Compilation Results

Custom Input

Y.O.G.I. (AI Bot)

Compilation Completed

For Input:  

49 10 30

Expected Output:

49 10 30

**PROBLEM-2**

**AIM:-**

Remove duplicates from a sorted list

**CODE:-**

```
class Solution {
    public ListNode deleteDuplicates(ListNode head) {
        ListNode res = head;

        while (head != null && head.next != null) {
            if (head.val == head.next.val) {
                head.next = head.next.next;
            } else {
                head = head.next;
            }
        }

        return res;
    }
}
```

OUTPUT:-

Testcase

>\_ Test Result

Accepted

Runtime: 0 ms

• Case 1

• Case 2

Input

head =  
[1,1,2]

Output

[1,2]

Expected

[1,2]

Testcase

>\_ Test Result

Accepted

Runtime: 0 ms

• Case 1

• Case 2

Input

head =  
[1,1,2,3,3]

Output

[1,2,3]

Expected

[1,2,3]

PROBLEM-3

AIM:-

Reverse a linked list

CODE:-

```
class Solution {
    public ListNode reverseList(ListNode head) {
        ListNode node = null;

        while (head != null) {
            ListNode temp = head.next;
            head.next = node;
            node = head;
            head = temp;
        }

        return node;
    }
}
```

OUTPUT:-

Testcase

Test Result

AcceptedRuntime: 0 ms

Case 1

Case 2

Case 3

Input

head =  
[1,2,3,4,5]

Output

[5,4,3,2,1]

Expected

[5,4,3,2,1]

Testcase

Test Result

AcceptedRuntime: 0 ms

Case 1

Case 2

Case 3

Input

head =  
[1,2]

Output

[2,1]

Expected

[2,1]

Testcase

Test Result

AcceptedRuntime: 0 ms

Case 1

Case 2

Case 3

Input

head =  
[]

Output

[]

Expected

[]

PROBLEM-4

AIM:-

Delete middle node of a list

CODE:-

```
class Solution {
    public ListNode deleteMiddle(ListNode head) {
        ListNode counter = head;
        int count = 0;
        while(counter != null){
            counter = counter.next;
            count++;
        }
        ListNode curr = head;
        if(count == 1){
            return curr.next;
        }
        int middle = (count/2) - 1;
```

```

        count = 0;

        while(count != middle){

            curr = curr.next;

            count++;

        }

        curr.next = curr.next.next;

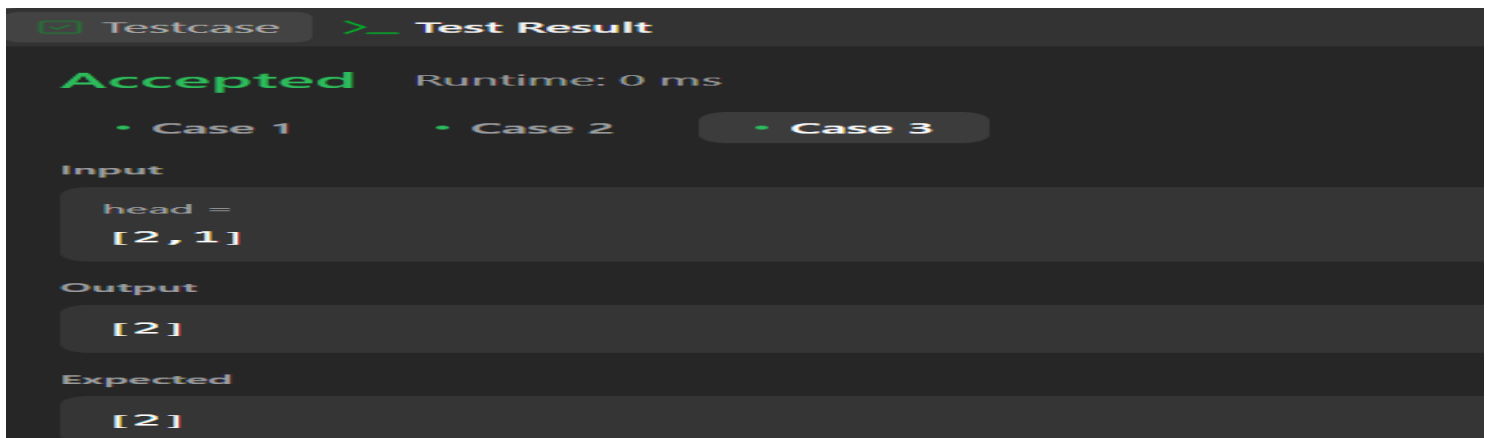
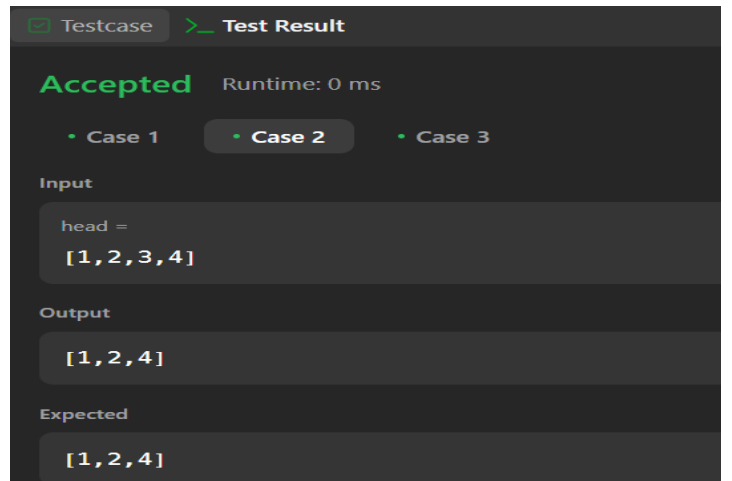
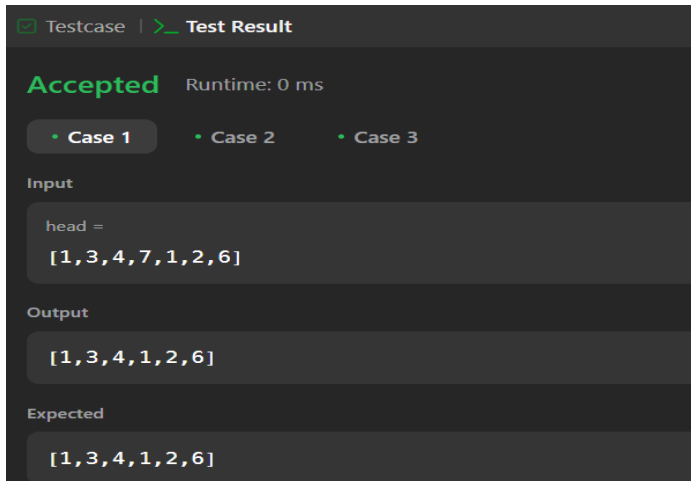
        return head;

    }

}

```

## OUTPUT:-



## PROBLEM-5

### AIM:-

Merge two sorted linked lists

### CODE:-

```

class Solution {

    public ListNode mergeTwoLists(ListNode list1, ListNode list2) {

        ListNode dummy = new ListNode();

        ListNode cur = dummy;

        while (list1 != null && list2 != null) {

            if (list1.val > list2.val) {

                cur.next = list2;

                list2 = list2.next;

            } else {

                cur.next = list1;

                list1 = list1.next;

            }

        }

    }

}

```

```
        cur = cur.next;
    }

    cur.next = (list1 != null) ? list1 : list2;

    return dummy.next;
}
}
```

OUTPUT:-

Testcase

Test Result

Accepted

Runtime: 0 ms

Case 1

Case 2

Case 3

Input

list1 =  
[1,2,4]

list2 =  
[1,3,4]

Output

[1,1,2,3,4,4]

Expected

[1,1,2,3,4,4]

Testcase

Test Result

Accepted

Runtime: 0 ms

Case 1

Case 2

Case 3

Input

list1 =  
[]

list2 =  
[]

Output

[]

Expected

[]

Testcase

Test Result

Accepted

Runtime: 0 ms

Case 1

Case 2

Case 3

Input

list1 =  
[]

list2 =  
[0]

Output

[0]

Expected

[0]

PROBLEM-6

AIM:-

Remove duplicates from sorted lists 2

CODE:-

```
class Solution {
    public ListNode deleteDuplicates(ListNode head) {
        ListNode ans = new ListNode(1000, head);
        ListNode cur = ans;

        while (cur.next != null && cur.next.next != null) {
            if (cur.next.val == cur.next.next.val) {
                int val = cur.next.val;
                while (cur.next != null && cur.next.val == val) {
                    cur.next = cur.next.next;
                }
            } else {
                cur = cur.next;
            }
        }
    }
}
```

```

        }
    }

    return ans.next;
}
}

```

## OUTPUT:-

☒ Testcase
 |
 [Test Result](#)

**Accepted**
Runtime: 0 ms

• Case 1
• Case 2

**Input**

head =  
 [1,2,3,3,4,4,5]

**Output**

[1,2,5]

**Expected**

[1,2,5]

☒ Testcase
 |
 [Test Result](#)

**Accepted**
Runtime: 0 ms

• Case 1
• Case 2

**Input**

head =  
 [1,1,1,2,3]

**Output**

[2,3]

**Expected**

[2,3]

## PROBLEM-7

### AIM:-

Detect a cycle in a linked list

### CODE:-

```

public class Solution {
    public boolean hasCycle(ListNode head) {
        ListNode fast = head;
        ListNode slow = head;

        while (fast != null && fast.next != null) {
            fast = fast.next.next;
            slow = slow.next;

            if (fast == slow) {
                return true;
            }
        }
    }
}

```

```
        return false;
    }
}
```

## OUTPUT:-

Testcase | Test Result

Accepted Runtime: 0 ms

Case 1 Case 2 Case 3

Input

head =  
[3,2,0,-4]

pos =  
1

Output

true

Expected

true

Testcase | Test Result

Accepted Runtime: 0 ms

Case 1 Case 2 Case 3

Input

head =  
[1,2]

pos =  
0

Output

true

Expected

true

Testcase | Test Result

Accepted Runtime: 0 ms

Case 1 Case 2 Case 3

Input

head =  
[1]

pos =  
-1

Output

false

Expected

false

## PROBLEM-8

### AIM:-

Reverse linked list 2

### CODE:-

```
class Solution {
    public ListNode reverseBetween(ListNode head, int left, int right) {
        if (head == null || left == right) {
            return head;
        }
        ListNode dummy = new ListNode(0);
        dummy.next = head;
        ListNode prev = dummy;
        for (int i = 0; i < left - 1; i++) {
            prev = prev.next;
        }
        ListNode cur = prev.next;
        for (int i = 0; i < right - left; i++) {
```



```

        ListNode temp = cur.next;

        cur.next = temp.next;

        temp.next = prev.next;

        prev.next = temp;

    }

    return dummy.next;

}

```

## OUTPUT:-

Testcase
Test Result

Accepted
Runtime: 0 ms

Case 1
Case 2

Input

head =  
[1,2,3,4,5]

left =  
2

right =  
4

Output

[1,4,3,2,5]

Expected

[1,4,3,2,5]

Testcase
Test Result

Accepted
Runtime: 0 ms

Case 1
Case 2

Input

head =  
[5]

left =  
1

right =  
1

Output

[5]

Expected

[5]

## PROBLEM-9

### AIM:-

Rotate a list

### CODE:-

```

class Solution {

    public ListNode rotateRight(ListNode head, int k) {

        if (head == null || head.next == null || k == 0) {

            return head;

        }

        int length = 1;

        ListNode temp = head;

        while (temp.next != null) {

            temp = temp.next;

            length++;

        }

        temp.next = head;

        k = k % length;
    }
}

```

```

        k = length - k;
        while (k-- > 0) {
            temp = temp.next;
        }
        head = temp.next;
        temp.next = null;
        return head;
    }
}

```

## OUTPUT:-

Testcase

Test Result

Accepted

Runtime: 0 ms

Case 1

Case 2

Input

head =  
[1,2,3,4,5]

k =  
2

Output

[4,5,1,2,3]

Expected

[4,5,1,2,3]

Testcase

Test Result

Accepted

Runtime: 0 ms

Case 1

Case 2

Input

head =  
[0,1,2]

k =  
4

Output

[2,0,1]

Expected

[2,0,1]

## PROBLEM-10

### AIM:-

Merge k sorted lists

### CODE:-

```

class Solution {
    public ListNode mergeKLists(ListNode[] lists) {
        if (lists == null || lists.length == 0) {
            return null;
        }
        return mergeKListsHelper(lists, 0, lists.length - 1);
    }

    private ListNode mergeKListsHelper(ListNode[] lists, int start, int end) {
        if (start == end) {
            return lists[start];
        }
        if (start + 1 == end) {

```

```

        return merge(lists[start], lists[end]);
    }

    int mid = start + (end - start) / 2;

    ListNode left = mergeKListsHelper(lists, start, mid);
    ListNode right = mergeKListsHelper(lists, mid + 1, end);

    return merge(left, right);
}

private ListNode merge(ListNode l1, ListNode l2) {
    ListNode dummy = new ListNode(0);
    ListNode curr = dummy;

    while (l1 != null && l2 != null) {
        if (l1.val < l2.val) {
            curr.next = l1;
            l1 = l1.next;
        } else {
            curr.next = l2;
            l2 = l2.next;
        }
        curr = curr.next;
    }
    curr.next = (l1 != null) ? l1 : l2;
    return dummy.next;
}
}

```

**OUTPUT:-**

☒ Testcase
 |
 [>\\_ Test Result](#)

**Accepted**
Runtime: 0 ms

• Case 1
• Case 2
• Case 3

**Input**

lists =  
[ [1,4,5] , [1,3,4] , [2,6] ]

**Output**

[1,1,2,3,4,4,5,6]

**Expected**

[1,1,2,3,4,4,5,6]

Testcase

>\_ Test Result

Accepted

Runtime: 0 ms

• Case 1

• Case 2

• Case 3

Input

lists =  
[]

Output

[]

Expected

[]

Testcase

>\_ Test Result

Accepted

Runtime: 0 ms

• Case 1

• Case 2

• Case 3

Input

lists =  
[ [] ]

Output

[]

Expected

[]

PROBLEM-11

AIM:-

Sort List

CODE:-

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

    ListNode mid = slow.next;
    slow.next = null;
```

```

        ListNode left = sortList(head);
        ListNode right = sortList(mid);
        return merge(left, right);
    }

    private ListNode merge(ListNode l1, ListNode l2) {
        ListNode dummy = new ListNode(0);
        ListNode tail = dummy;

        while (l1 != null && l2 != null) {
            if (l1.val < l2.val) {
                tail.next = l1;
                l1 = l1.next;
            } else {
                tail.next = l2;
                l2 = l2.next;
            }
            tail = tail.next;
        }

        tail.next = (l1 != null) ? l1 : l2;
        return dummy.next;
    }
}

```

## OUTPUT:-

☒ Testcase
 |
 [Test Result](#)

**Accepted**
Runtime: 0 ms

• Case 1

• Case 2

• Case 3

**Input**

head =  
**[4,2,1,3]**

**Output**

**[1,2,3,4]**

**Expected**

**[1,2,3,4]**

☒ Testcase | [>\\_ Test Result](#)

**Accepted** Runtime: 0 ms

• Case 1 • **Case 2** • Case 3

Input

```
head =  
[-1,5,3,4,0]
```

Output

```
[-1,0,3,4,5]
```

Expected

```
[-1,0,3,4,5]
```

☒ Testcase | [>\\_ Test Result](#)

**Accepted** Runtime: 0 ms

• Case 1 • Case 2 • **Case 3**

Input

```
head =  
[]
```

Output

```
[]
```

Expected

```
[]
```