

## Linked List Solutions

Solution 1:

Time Complexity :  $O(m*n)$

Space Complexity:  $O(1)$

```
class Solution {  
  
    static class Node {  
        int data;  
        Node next;  
        Node(int d){  
            data = d;  
            next = null;  
        }  
    }  
  
    public Node getIntersectionNode(Node head1, Node head2)  
    {  
        while (head2 != null) {  
            Node temp = head1;  
            while (temp != null) {  
                if (temp == head2) {  
                    return head2;  
                }  
                temp = temp.next;  
            }  
            head2 = head2.next;  
        }  
        return null;  
    }  
  
    public static void main(String[] args){  
        Solution list = new Solution();  
  
        Node head1, head2;  
        head1 = new Node(10);  
        head2 = new Node(3);  
    }  
}
```

```

Node newNode = new Node(6);
head2.next = newNode;

newNode = new Node(9);
head2.next.next = newNode;

newNode = new Node(15);
head1.next = newNode;
head2.next.next.next = newNode;

newNode = new Node(30);
head1.next.next = newNode;

head1.next.next.next = null;

Node intersectionPoint
    = list.getIntersectionNode(head1, head2);

if (intersectionPoint == null) {
    System.out.print(" No Intersection Point \n");
}
else {
    System.out.print("Intersection Point: "
        + intersectionPoint.data);
}
}
}

```

**Solution 2:**

Time Complexity :  $O(n)$

Space Complexity:  $O(1)$

```
import java.util.*;
```

```
class Solution{
```

```
static class Node{
```

```
    int data;
```

```
    Node next;
```

```
};
```

```
static Node push( Node head_ref, int new_data){  
    Node new_node = new Node();  
    new_node.data = new_data;  
    new_node.next = (head_ref);  
    (head_ref) = new_node;  
    return head_ref;  
}
```

```
static void printList( Node head){  
    Node temp = head;  
    while (temp != null){  
        System.out.printf("%d ", temp.data);  
        temp = temp.next;  
    }  
    System.out.printf("\n");  
}
```

```
static void skipMdeleteN( Node head, int M, int N){  
    Node curr = head, t;  
    int count;  
  
    while (curr!=null){  
        for (count = 1; count < M && curr != null; count++){  
            curr = curr.next;  
        }  
  
        if (curr == null)  
            return;  
        t = curr.next;  
        for (count = 1; count <= N && t != null; count++){  
            Node temp = t;  
            t = t.next;  
        }  
  
        curr.next = t;  
        curr = t;  
    }  
}
```

```
public static void main(String args[]){
    Node head = null;
    int M=2, N=3;
    head=push(head, 10);
    head=push(head, 9);
    head=push(head, 8);
    head=push(head, 7);
    head=push(head, 6);
    head=push(head, 5);
    head=push(head, 4);
    head=push(head, 3);
    head=push(head, 2);
    head=push(head, 1);

    System.out.printf("M = %d, N = %d \n" +
                      "Linked list we have is :\n", M, N);

    printList(head);

    skipMdeleteN(head, M, N);

    System.out.printf("\nLinked list on deletion is :\n");
    printList(head);
}
}
```

### Solution 3 :

Time Complexity :  $O(n)$

Space Complexity:  $O(1)$

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

```
}
```

```
class Solution {
    Node head;

    public void swapNodes(int x, int y){
        if (x == y)
            return;

        Node prevX = null, currX = head;
        while (currX != null && currX.data != x) {
            prevX = currX;
            currX = currX.next;
        }

        Node prevY = null, currY = head;
        while (currY != null && currY.data != y) {
            prevY = currY;
            currY = currY.next;
        }

        if (currX == null || currY == null)
            return;

        if (prevX != null)
            prevX.next = currY;
        else
            head = currY;

        if (prevY != null)
            prevY.next = currX;
        else
            head = currX;

        Node temp = currX.next;
        currX.next = currY.next;
        currY.next = temp;
    }
}
```

```
public void push(int new_data){
```

```
        Node new_Node = new Node(new_data);
        new_Node.next = head;
        head = new_Node;
    }

    public void printList(){
        Node tNode = head;
        while (tNode != null) {
            System.out.print(tNode.data + " ");
            tNode = tNode.next;
        }
    }

    public static void main(String[] args){
        Solution llist = new Solution();

        llist.push(7);
        llist.push(6);
        llist.push(5);
        llist.push(4);
        llist.push(3);
        llist.push(2);
        llist.push(1);

        System.out.print(
            "\n Linked list before ");
        llist.printList();

        llist.swapNodes(4, 3);

        System.out.print(
            "\n Linked list after ");
        llist.printList();
    }
}
```

**Solution 4 :**

Time Complexity :  $O(n)$

Space Complexity:  $O(1)$

```
class Solution{
    Node head;
    class Node{
        int data;
        Node next;
        Node(int d){
            data = d;
            next = null;
        }
    }

    void segregateEvenOdd(){
        Node end = head;
        Node prev = null;
        Node curr = head;

        while (end.next != null)
            end = end.next;

        Node new_end = end;

        while (curr.data %2 !=0 && curr != end){
            new_end.next = curr;
            curr = curr.next;
            new_end.next.next = null;
            new_end = new_end.next;
        }

        if (curr.data %2 ==0){
            head = curr;
            while (curr != end){
                if (curr.data % 2 == 0){
                    prev = curr;
                    curr = curr.next;
                }
                else{
                    prev.next = curr.next;
                    curr.next = null;
                    new_end.next = curr;
                }
            }
        }
    }
}
```

```

                                new_end = curr;
                                curr = prev.next;
                            }
                        }
                    }
                else prev = curr;
                if (new_end != end && end.data %2 != 0){
                    prev.next = end.next;
                    end.next = null;
                    new_end.next = end;
                }
            }
        }
        void push(int new_data){
            Node new_node = new Node(new_data);
            new_node.next = head;
            head = new_node;
        }

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

        public static void main(String args[]){
            Solution llist = new Solution();
            llist.push(11);
            llist.push(10);
            llist.push(8);
            llist.push(6);
            llist.push(4);
            llist.push(2);
            llist.push(0);
            System.out.println("Linked List");
            llist.printList();

            llist.seggregateEvenOdd();
        }
    }
}

```



```
        System.out.println("updated Linked List");
        llist.printList();
    }
}
```

Solution 5 :

Time Complexity :  $O(n \cdot \log k)$

Space Complexity:  $O(n)$

```
public class Solution {
    public static Node SortedMerge(Node a, Node b){
        Node result = null;
        if (a == null)
            return b;
        else if (b == null)
            return a;
        if (a.data <= b.data) {
            result = a;
            result.next = SortedMerge(a.next, b);
        }
        else {
            result = b;
            result.next = SortedMerge(a, b.next);
        }

        return result;
    }

    public static Node mergeKLists(Node arr[], int last)
    {
        while (last != 0) {
            int i = 0, j = last;
            while (i < j) {
                arr[i] = SortedMerge(arr[i], arr[j]);
                i++;
                j--;
                if (i >= j)
                    last = j;
            }
        }
    }
}
```

```
    }

    return arr[0];
}

public static void printList(Node node){
    while (node != null) {
        System.out.print(node.data + " ");
        node = node.next;
    }
}

public static void main(String args[]){
    int k = 3;
    int n = 4;
    Node arr[] = new Node[k];

    arr[0] = new Node(1);
    arr[0].next = new Node(3);
    arr[0].next.next = new Node(5);
    arr[0].next.next.next = new Node(7);

    arr[1] = new Node(2);
    arr[1].next = new Node(4);
    arr[1].next.next = new Node(6);
    arr[1].next.next.next = new Node(8);

    arr[2] = new Node(0);
    arr[2].next = new Node(9);
    arr[2].next.next = new Node(10);
    arr[2].next.next.next = new Node(11);

    Node head = mergeKLists(arr, k - 1);
    printList(head);
}

}

class Node {
    int data;
    Node next;
    Node(int data){
```

```
        this.data = data;  
    }  
}
```

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