Task 5

a)

class ListNode {

int val;

ListNode next;

ListNode(int val) { this.val = val; }

}

public class InsertionSortLinkedList {

public static ListNode insertionSort(ListNode head) {

if (head == null) return null;

ListNode dummy = new ListNode(0); // dummy head

ListNode curr = head;

while (curr != null) {

ListNode prev = dummy;

while (prev.next != null && prev.next.val < curr.val) {

prev = prev.next;

}

ListNode next = curr.next;

curr.next = prev.next;

prev.next = curr;

curr = next;

}

return dummy.next;

}

public static void printList(ListNode head) {

while (head != null) {

System.out.print(head.val + " ");

head = head.next;

}

System.out.println();

}

public static void main(String[] args) {

ListNode head = new ListNode(4);

head.next = new ListNode(2);

head.next.next = new ListNode(1);

head.next.next.next = new ListNode(3);

head = insertionSort(head);

printList(head); // 1 2 3 4

}

}

b)

public class RemoveElementLinkedList {

public static ListNode removeElement(ListNode head, int val) {

ListNode dummy = new ListNode(0);

dummy.next = head;

ListNode curr = dummy;

while (curr.next != null) {

if (curr.next.val == val) {

curr.next = curr.next.next; // remove node

} else {

curr = curr.next;

}

}

return dummy.next;

}

public static void printList(ListNode head) {

while (head != null) {

System.out.print(head.val + " ");

head = head.next;

}

System.out.println();

}

public static void main(String[] args) {

ListNode head = new ListNode(1);

head.next = new ListNode(2);

head.next.next = new ListNode(6);

head.next.next.next = new ListNode(3);

head = removeElement(head, 6);

printList(head); // 1 2 3

}

}

c)

import java.util.\*;

public class RemoveDuplicatesLinkedList {

public static ListNode removeDuplicates(ListNode head) {

if (head == null) return null;

HashSet<Integer> seen = new HashSet<>();

ListNode curr = head;

seen.add(curr.val);

while (curr.next != null) {

if (seen.contains(curr.next.val)) {

curr.next = curr.next.next; // skip duplicate

} else {

seen.add(curr.next.val);

curr = curr.next;

}

}

return head;

}

public static void printList(ListNode head) {

while (head != null) {

System.out.print(head.val + " ");

head = head.next;

}

System.out.println();

}

public static void main(String[] args) {

ListNode head = new ListNode(1);

head.next = new ListNode(2);

head.next.next = new ListNode(2);

head.next.next.next = new ListNode(3);

head = removeDuplicates(head);

printList(head); // 1 2 3

}

}