

# Assignment Questions 12



## Question 1

Given a singly linked list, delete **middle** of the linked list. For example, if given linked list is 1->2->3->4->5 then linked list should be modified to 1->2->4->5. If there are **even** nodes, then there would be **two middle** nodes, we need to delete the second middle element. For example, if given linked list is 1->2->3->4->5->6 then it should be modified to 1->2->3->5->6. If the input linked list is NULL or has 1 node, then it should return NULL

### Example 1:

```
Input: LinkedList: 1->2->3->4->5 Output: 1 2 4 5
```

### Example 2:

```
Input: LinkedList: 2->4->6->7->5->1 Output: 2 4 6 5 1
```



## Question 2

Given a linked list of **N** nodes. The task is to check if the linked list has a loop. Linked list can contain self loop.

### Example 1:

Input:  $N = 3$  value[] = {1,3,4} x(position at which tail is connected) = 2 Output:True Explanation:In above test case  $N = 3$ . The linked list with nodes  $N = 3$  is given. Then value of  $x=2$  is given which means last node is connected with  $x$ th node of linked list. Therefore, there exists a loop.

### Example 2:

Input:  $N = 4$  value[] = {1,8,3,4}  $x = 0$  Output:False Explanation:For  $N = 4$ ,  $x = 0$  means then  $\text{lastNode} \rightarrow \text{next} = \text{NULL}$ , then the Linked list does not contain any loop.

### 💡 Question 3

Given a linked list consisting of  $L$  nodes and given a number  $N$ . The task is to find the  $N$ th node from the end of the linked list.

**Example 1:**

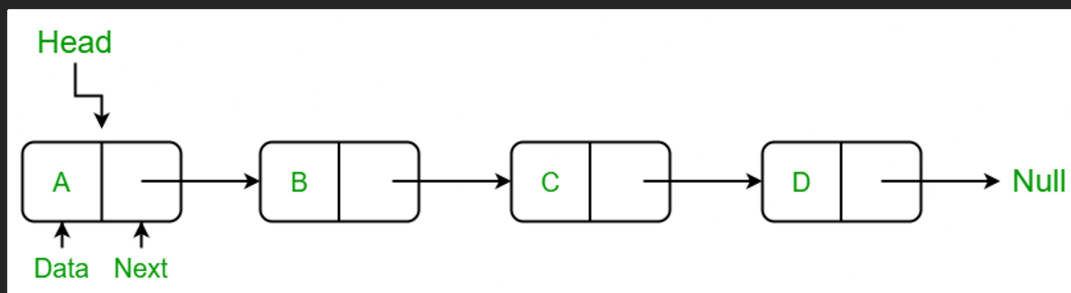
Input:  $N = 2$  LinkedList:  $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8 \rightarrow 9$  Output: 8 Explanation: In the first example, there are 9 nodes in linked list and we need to find 2nd node from end. 2nd node from end is 8.

**Example 2:**

Input:  $N = 5$  LinkedList:  $10 \rightarrow 5 \rightarrow 100 \rightarrow 5$  Output: -1 Explanation: In the second example, there are 4 nodes in the linked list and we need to find 5th from the end. Since 'n' is more than the number of nodes in the linked list, the output is -1.

### 💡 Question 4

Given a singly linked list of characters, write a function that returns true if the given list is a palindrome, else false.



**Examples:**

Input:  $R \rightarrow A \rightarrow D \rightarrow A \rightarrow R \rightarrow \text{NULL}$

Output: Yes

Input:  $C \rightarrow O \rightarrow D \rightarrow E \rightarrow \text{NULL}$

Output: No



## Question 5

Given a linked list of **N** nodes such that it may contain a loop.

A loop here means that the last node of the link list is connected to the node at position **X**(1-based index). If the link list does not have any loop, **X=0**.

Remove the loop from the linked list, if it is present, i.e. unlink the last node which is forming the loop.

### Example 1:

```
Input: N = 3 value[] = {1,3,4} X = 2 Output:1 Explanation:The link list looks like 1 -> 3 -> 4 ^ | |____| A loop is present. If you remove it successfully, the answer will be 1.
```

### Example 2:

```
Input: N = 4 value[] = {1,8,3,4} X = 0 Output:1 Explanation:The linked list does not contain any loop.
```

### Example 3:

```
Input: N = 4 value[] = {1,2,3,4} X = 1 Output:1 Explanation:The linked list looks like 1 -> 2 -> 3 -> 4 ^ | |_____| A loop is present. If you remove it successfully, the answer will be 1.
```

### Question 6

Given a linked list and two integers M and N. Traverse the linked list such that you retain M nodes then delete next N nodes, continue the same till end of the linked list.

Difficulty Level: Rookie

Examples:

```
Input: M = 2, N = 2 Linked List: 1->2->3->4->5->6->7->8 Output: L
inked List: 1->2->5->6 Input: M = 3, N = 2 Linked List: 1->2->3->
4->5->6->7->8->9->10 Output: Linked List: 1->2->3->6->7->8 Input:
M = 1, N = 1 Linked List: 1->2->3->4->5->6->7->8->9->10 Output: L
inked List: 1->3->5->7->9
```

### Question 7

Given two linked lists, insert nodes of second list into first list at alternate positions of first list.

For example, if first list is 5->7->17->13->11 and second is 12->10->2->4->6, the first list should become 5->12->7->10->17->2->13->4->11->6 and second list should become empty. The nodes of second list should only be inserted when there are positions available. For example, if the first list is 1->2->3 and second list is 4->5->6->7->8, then first list should become 1->4->2->5->3->6 and second list to 7->8.

Use of extra space is not allowed (Not allowed to create additional nodes), i.e., insertion must be done in-place. Expected time complexity is  $O(n)$  where n is number of nodes in first list.

💡 Question 8

Given a singly linked list, find if the linked list is circular or not.

A linked list is called circular if it is not NULL-terminated and all nodes are connected in the form of a cycle. Below is an example of a circular linked list.

