Linked List

You can assume your node class is given.

```
class Node:
    def __init__(self, elem, next):
        self.elem = elem
        self.next = next
```

However, you may need to change the node class according to your problem.

Question 01

Write a function that moves the last node to the front in a given Singly Linked List.

Examples:

Input: 1 → 2 → 3 → 4 → 5
Output: 5 → 1 → 2 → 3 → 4

Input: 3 → 8 → 1 → 5 → 7 → 12
Output: 12 → 3 → 8 → 1 → 5 → 7

Question 02

Given two lists sorted in increasing order, create and return a new list representing the intersection of the two lists. The new list should be made with its own memory — the original lists should not be changed.

Example:

Input:
First linked list: 1 → 2 → 3 → 4 → 6
Second linked list be 2 → 4 → 6 → 8,
Output: 2 → 4 → 6.
The elements 2, 4, 6 are common in
both the list so they appear in the
intersection list.

Input:
First linked list: 1 → 2 → 3 → 4 → 5
Second linked list be 2 → 3 → 4,
Output: 2 → 3 → 4
The elements 2, 3, 4 are common in both the list so they appear in the intersection list.

Question 03

You are given a linked list that contains N integers. You have performed the following reverse operation on the list:

Select all the subparts of the list that contain only even integers. For example, if the list is {1, 2, 8, 9, 12, 16}, then the selected subparts will be {2, 8}, {12, 16}.
Reverse the selected subpart such as {8, 2} and {16, 12}.
Now, you are required to retrieve the original list.

Input format

First line: N
Next line: N space-separated integers that denote elements of the reverse list
Output format

Print the N elements of the original list.

Sample Input
9
2 18 24 3 5 7 9 6 12

Sample Output
24 18 2 3 5 7 9 12 6

Explanation
In the sample, the original list is {24, 18, 2, 3, 5, 7, 9, 12, 6,} which when reversed according to the operations will result in the list given in the sample input.

Question - 04

Given a Linked List of integers, write a function to modify the linked list such that all even numbers appear before all the odd numbers in the modified linked list. Also, keep the order of even and odd numbers the same.

Examples:

Input: 17 → 15 → 8 → 12 → 10 → 5 → 4 → 1 → 7 → 6 → None
Output: 8 → 12 → 10 → 4 → 6 → 17 → 15 → 5 → 1 → 7 → None

Input: 8 → 12 → 10 → 5 → 4 → 1 → 6 → None
Output: 8 → 12 → 10 → 4 → 6 → 5 → 1 → None

Question - 05

Given a Linked List and a number N, write a function that returns the value at the Nth node from the end of the Linked List.

Example:
Input:
10 → 20 → 30 → 40 → 50 → None
N = 2
Output: 40

Input:
35 → 15 → 4 → 20 → 45 → None
N = 4
Output: 15

Question - 06

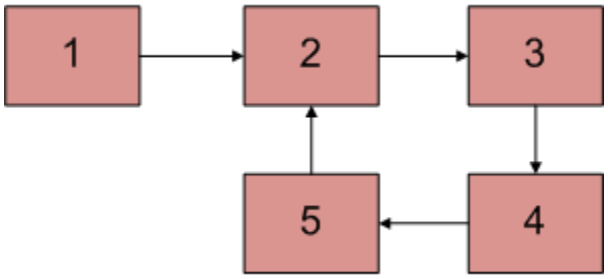
Given a singly linked list, find the middle of the linked list. If there are even nodes, then there would be two middle nodes, we need to print the second middle element.

Example:
Input: 10 → 20 → 30 → 40 → 50 → None
Ouput: 30

Input: 1 → 2 → 3 → 4 → 5 → 6 → None
Output: 4

Question - 07

Given a linked list, check if the linked list has a loop or not. The below diagram shows a linked list with a loop.



Question - 08

After getting her PhD, Christie has become a celebrity at her university, and her facebook profile is full of friend requests. Being the nice girl she is, Christie has accepted all the requests.

Now Kuldeep is jealous of all the attention she is getting from other guys, so he asks her to delete some of the guys from her friend list.

To avoid a 'scene', Christie decides to remove some friends from her friend list, since she knows the popularity of each of the friend she has, she uses the following algorithm to delete a friend.

```
Algorithm Delete(Friend):
   DeleteFriend=false
   for i = 1 to Friend.length-1
       if (Friend[i].popularity < Friend[i+1].popularity)
          delete i th friend
          DeleteFriend=true
          break
   if(DeleteFriend == false)
      delete the last friend
```

Input:
First line contains T number of test cases. First line of each test case contains N, the number of friends Christie currently has and K ,the number of friends Christie decides to delete. Next lines contains popularity of her friends separated by space.

Output:
For each test case print N-K numbers which represent popularity of Christie friend's after deleting K friends.

NOTE:
Order of friends after deleting exactly K friends should be maintained as given in input.

Sample Input
3
3 1
3 100 1
5 2
19 12 3 4 17
5 3
23 45 11 77 18

Sample Output
100 1
19 12 17
77 18

Question - 09

A number is Palindrome if it reads same from front as well as back.For example,
2332 is palindrome number as its read same from both sides.

Linked List can also be palindrome if they have the same order when it traverse from forward as well as backward.

Write a function that will take a linked list as input and return True if the list is a palindrome and return False otherwise.

Sample Input 1:
1 → 2 → 3 → 2 → 1 → None

Sample Output 1:
True

Sample Input 2:
1 → 2 → 3 → 1 → 1 → None

Sample Output 2:
False

Question - 10

Given a Singly Linked List, starting from the second node delete all alternate nodes of it.

Example:
Input: 10 → 20 → 30 → 40 → 50 → None
Ouput: 10 → 30 → 50 → None

Input: 1 → 2 → 3 → 4 → 5 → 6 → None
Output: 1 → 3 → 5 → None

Question - 11

Two Linked Lists are identical when they have the same data and the arrangement of data is also the same. Write a function to check if the given two linked lists are identical.

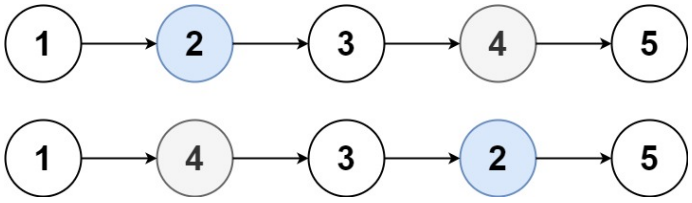
Examples:
Input:
a = 1 → 2 → 3 → 4 → 5 → None
b = 1 → 2 → 3 → 4 → 5 → None
Output: Identical

Input:
a = 1 → 2 → 3 → 4 → None
b = 1 → 7 → 4 → 5 → None
Output: Not Identical

Question - 12

You are given a linked list, and an integer k.

Return the head of the linked list after swapping the values of the kth node from the beginning and the kth node from the end (the list is 1-indexed).



Example:
Input:
a = 1 → 2 → 3 → 4 → 5 → None
k = 2
Output: 1 → 4 → 3 → 2 → 5 → None

Input:
a = 1 → 7 → 4 → 5 → None
k = 2
Output: 1 → 4 → 7 → 5 → None

Reference:

1. https://www.geeksforgeeks.org/practice-questions-for-linked-list-and-recursion/
2. https://www.hackerearth.com/practice/data-structures/linked-list/singly-linked-list/practice-problems/algorithm/reversed-linked-list-01b722df/
3. https://www.hackerearth.com/practice/data-structures/linked-list/singly-linked-list/practice-problems/algorithm/remove-friends-5/
4. https://iq.opengenus.org/list-of-linked-list-problems/
5. https://leetcode.com/problems/swapping-nodes-in-a-linked-list/