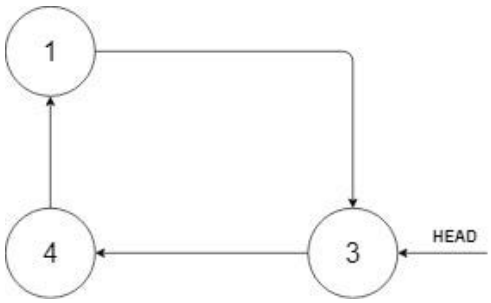
PSG COLLEGE OF TECHNOLOGY

DEPARTMENT OF COMPUTER APPLICATIONS

23MX17- DATA STRUCTURES LABORATORY

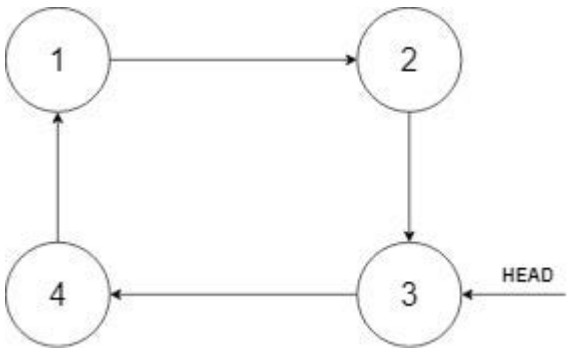
1. Given a Circular Linked List node, which is sorted in ascending order, write a function to insert a value insertVal into the list such that it remains a sorted circular list. The given node can be a reference to any single node in the list and may not necessarily be the smallest value in the circular list. If there are multiple suitable places for insertion, you may choose any place to insert the new value. After the insertion, the circular list should remain sorted. If the list is empty (i.e., the given node is null), you should create a new single circular list and return the reference to that single node. Otherwise, you should return the originally given node.
   Example 1:



   Input: head = [3,4,1], insertVal = 2

   Output: [3,4,1,2]

   Explanation: In the figure above, there is a sorted circular list of three elements. You are given a reference to the node with value 3, and we need to insert 2 into the list. The new node should be inserted between node 1 and node 3. After the insertion, the list should look like this, and we should still return node 3.



   Example 2:

   Input: head = [], insertVal = 1

   Output: [1]

   Explanation: The list is empty (given head is null). We create a new single circular list and return the reference to that single node.

   Example 3:

Input: head = [1], insertVal = 0

Output: [1,0]

2. A linked list contains N nodes numbered from 1 to N. The tail of the list points to head of the list i.e. the linked list is circular in nature.

   For when N=5
   1->2->3->4,
   ^-------5<---'
   An integer K is also given to you.You start counting from head and when you reach Kth node in the circular list you remove that node. For eg. if K=7 we start from head i.e. 1 right now nd move K steps ahead till we reach node numbered 3 in circular list
   1->2->3->4->5->1->2->[3] <---- we remove this node
   now the new linked list looks like this
   1->2->4,
   ^---5<---'
   Node numbered 3 has been removed and now we start counting from the next node. This process is repeated until only one Node is left.
   Your task is to determine the number of the last node.
   Sample Input
   N=3 K=1
   Output:
   3
   Input:
   N=2 K=5
   Sample Output
   1
   Explanation
   Case 1: N=3,K=1 1->[2]->3 [2 is removed and counting starts from 3] 3->[1] [1 is removed and only 3 remains now]
   Case 2: N=2 K=5 1->2->1->2->1->[2] [2 is removed and only 1 remains now]
3. In the above question, the TA instead sends all students to classrooms in a circular manner. The first student entering goes to the first classroom, the second student entering goes to the second classroom and so on. There are k classrooms with infinite capacity. Implement using a circular linked list of stacks.
   Input:
   1
   10 3
   IIT2018001
   IIT2018002
   IIT2018003
   IIT2018004
   IIT2018005
   IIT2018006
   IIT2018007
   IIT2018008
   IIT2018009
   IIT2018010
   Output:

IIT2018001
IIT2018004
IIT2018007
IIT2018010
IIT2018003
IIT2018006
IIT2018009
IIT2018002
IIT2018005
IIT2018008