Assignment-1

Submission date: 09/3/25

Tasks of Singly Linked List:

- Print the linked list in reverse order.
- Reverse the linked list (before and after the operation, address of each node will remain same)
- Remove duplicates from a linked list.
- Detect loop or cycle in a linked list.
- Swap any two nodes (only links will change, not to swap the values).
- Assume that you have a linked list having even and odd values. Your task is to spit the list into two separate lists of even and odd.
- Reverse the first half and second of the linked list i.e. assume that the list is:

  1->2->3->4->5->6->7->8

  After calling the reverse method the list should be:

  4->3->2->1->8->7->6->5
- Given a singly linked list, write a function to swap elements pairwise i.e. assume that the list is:

  Input : 1->2->3->4->5->6->NULL
  Output : 2->1->4->3->6->5->NULL

Tasks of Circular Linked List:

- Write the program to solve the Josephus problem. In Josephus problem you are Given the total number of persons **N** and the number **M**, which indicates that **M-1** persons are skipped and the Mth person is killed in the circle, your task is to choose the place in the initial circle so that you are the last one remaining (survive).

Tasks of Doubly Linked List:

- Swap every alternate node of the doubly linked list starting from start and end i.e. assume that the list:

  Input: 1->2->3->4->5->6->7->8->9

  After calling the method the list should be:

  Input: 1->8->3->6->5->4->7->2->9

- Suppose you are working on a project to develop an inventory management system for a retail chain that has multiple stores in different cities across the country. The system should be able to maintain the records of the items in each store. Each store has different sections, and each section has different products. To implement this system, use best suitable Data Structure to maintain the records of items, locations, stores, and sections. Write the methods to perform following operations:
  - Add a new section in a store (toys, grocery, fruits….)
  - Store an item in a particular section of a particular store.
  - Remove an item in a particular section of a particular store.
  - Display the list of all items of a particular section of a store.
  - Display the list of items for a given store.

For example, to store an item in a location in a particular store, you can search for the node that represents the store, then search for the node that represents the section in the store, and then search for the node that represents the location in the section. Then, you can add a new node to the linked list that represents the items stored in the location. Same procedure will be for deletion operation.