

## 1. Insert a Node in a Sorted Doubly Linked List

Insert a new node in a sorted doubly linked list while keeping it sorted.

Example:

Input:  $2 \leftrightarrow 4 \leftrightarrow 8 \leftrightarrow 10$ , value = 6

Output:  $2 \leftrightarrow 4 \leftrightarrow 6 \leftrightarrow 8 \leftrightarrow 10$

## 2. Delete All Occurrences of a Given Key

Delete every node that contains the given key.

Example:

Input:  $1 \leftrightarrow 2 \leftrightarrow 2 \leftrightarrow 3 \leftrightarrow 4$ , key = 2

Output:  $1 \leftrightarrow 3 \leftrightarrow 4$

Hint: Carefully handle deletion at the head, middle, and tail nodes.

## 3. Find Pairs with a Given Sum

Find all pairs in a sorted doubly linked list whose sum equals a given number.

Example:

Input:  $1 \leftrightarrow 2 \leftrightarrow 4 \leftrightarrow 5 \leftrightarrow 6 \leftrightarrow 8 \leftrightarrow 9$ , sum = 7

Output: (1, 6), (2, 5)

Hint: Use two pointers: one from the start and one from the end. Move them based on the sum comparison.

## 4. Rotate Doubly Linked List by N Nodes

Rotate the list by  $N$  nodes from the beginning.

**Example:**

Input:  $10 \rightleftarrows 20 \rightleftarrows 30 \rightleftarrows 40 \rightleftarrows 50$ ,  $N = 2$

Output:  $30 \rightleftarrows 40 \rightleftarrows 50 \rightleftarrows 10 \rightleftarrows 20$

**Hint:** Find the  $N$ th node, adjust `head` and `tail` pointers accordingly.

## 5. Merge Two Sorted Doubly Linked Lists

Merge two sorted DLLs into one sorted list (without creating new nodes).

**Example:**

Input:  $List1 = 2 \rightleftarrows 4 \rightleftarrows 8$ ,  $List2 = 1 \rightleftarrows 3 \rightleftarrows 5$

Output:  $1 \rightleftarrows 2 \rightleftarrows 3 \rightleftarrows 4 \rightleftarrows 5 \rightleftarrows 8$

**Hint:** Compare nodes from both lists one by one, adjusting `prev` and `next` pointers.

## 6. Convert Binary Tree to Doubly Linked List

Convert a binary tree into a doubly linked list using inorder traversal.

**Example:**

Binary Tree:



Doubly Linked List:  $5 \leftrightarrow 10 \leftrightarrow 20$

## 7. Find Triplets with Given Sum in a Sorted Doubly Linked List

Find all triplets in a sorted doubly linked list that sum to a given value  $X$ .

**Example:**

Input:  $1 \leftrightarrow 2 \leftrightarrow 4 \leftrightarrow 5 \leftrightarrow 6 \leftrightarrow 8 \leftrightarrow 9$ , sum = 17

Output:  $(2, 6, 9)$  and  $(4, 5, 8)$

## 8. Merge K Sorted Doubly Linked Lists

You are given  $K$  sorted doubly linked lists.

Merge them all into one sorted list in  $O(N \log K)$  time.

**Example:** List1 =  $1 \leftrightarrow 4 \leftrightarrow 5$ , List2 =  $1 \leftrightarrow 3 \leftrightarrow 4$ , List3 =  $2 \leftrightarrow 6$

**Output:**  $1 \leftrightarrow 1 \leftrightarrow 2 \leftrightarrow 3 \leftrightarrow 4 \leftrightarrow 4 \leftrightarrow 5 \leftrightarrow 6$

## 9. Reverse Doubly Linked List in Groups of K

Reverse nodes of a doubly linked list in groups of size  $K$ .

**Example:**

Input:  $1 \Leftrightarrow 2 \Leftrightarrow 3 \Leftrightarrow 4 \Leftrightarrow 5 \Leftrightarrow 6 \Leftrightarrow 7 \Leftrightarrow 8$ ,  $K = 3$

Output:  $3 \Leftrightarrow 2 \Leftrightarrow 1 \Leftrightarrow 6 \Leftrightarrow 5 \Leftrightarrow 4 \Leftrightarrow 7 \Leftrightarrow 8$

**Hint:** Reverse the first  $K$  nodes, then recursively call for the rest of the list. Reattach using the new head and tail pointers.

## 10. Split a Circular Doubly Linked List into Two Halves

Given a **circular DLL**, split it into two equal halves.

**Example:**

Input:  $10 \Leftrightarrow 20 \Leftrightarrow 30 \Leftrightarrow 40 \Leftrightarrow 50 \Leftrightarrow$  (back to 10)

Output: List1 =  $10 \Leftrightarrow 20 \Leftrightarrow 30$ , List2 =  $40 \Leftrightarrow 50$