Merge Linked Lists

To merge two sorted linked lists, the best approach is to use a dummy node and iteratively compare and attach nodes from list 1 and list 2 in sorted order.

Strategy: Iterative Merge Using Dummy Node:

1. Create a dummy node to act as the start of the result list.
2. Use a tail pointer that always points to the last node of the merged list.
3. Traverse both lists:
   - Compare list 1 → val and list 2 → val
   - Append the smaller node to tail → next
   - Advance the pointer (list 1 or list 2) that you just used.
   - Move tail forward
4. After the loop, append the rest of the non-empty list.

Why use a dummy node?

It simplifies handling the head you don't need to check of the merged list is empty or not.

Time Complexity:
- $O(m+n)$ · visit each node once
- $O(1)$ extra space

Example:
Input: list 1 = [1, 2, 4], list 2 = [1, 3, 4]
Merged: [1, 1, 2, 3, 4, 4]