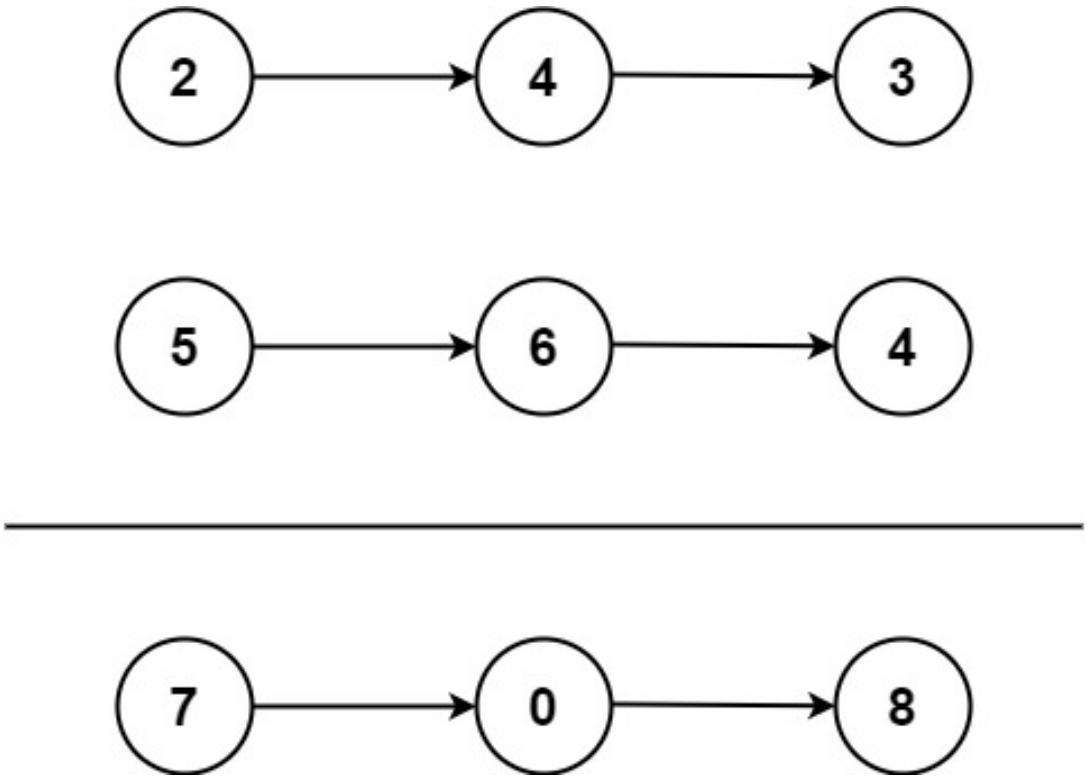
2. Add Two Numbers

Created	@July 10, 2020 6:17 AM
Difficulty	Medium
LC Url	https://leetcode.com/problems/add-two-numbers/
Importance	
Tag	LinkedList NEET
Video	

You are given two **non-empty** linked lists representing two non-negative integers. The digits are stored in **reverse order**, and each of their nodes contains a single digit. Add the two numbers and return the sum as a linked list.

You may assume the two numbers do not contain any leading zero, except the number 0 itself.

Example 1:



```
Input: l1 = [2,4,3], l2 = [5,6,4]
Output: [7,0,8]
Explanation: 342 + 465 = 807.
```

Example 2:

```
Input: l1 = [0], l2 = [0]
Output: [0]
```

Example 3:

```
Input: l1 = [9,9,9,9,9,9,9], l2 = [9,9,9,9]
Output: [8,9,9,9,0,0,0,1]
```

Constraints:

- The number of nodes in each linked list is in the range `[1, 100]`.
- `0 <= Node.val <= 9`
- It is guaranteed that the list represents a number that does not have leading zeros.

Solution

```
# Definition for singly-linked list.
# class ListNode:
#     def __init__(self, val=0, next=None):
#         self.val = val
#         self.next = next
class Solution:
    def addTwoNumbers(self, l1: Optional[ListNode], l2: Optional[ListNode]) -> Optional[ListNode]:
        # 新建dummy node
        dummy = ListNode()
        cur = dummy

        # 标识进位的数值，初始化为0，表示没有进位
        carry = 0
        # 只要l1或者l2还没有遍历结束 或者有进位（carry不为0）导致长度增加
        # 则继续循环
        while l1 or l2 or carry:
            # 如果l1不为空，则获取l1的值，否则给定为0
            v1 = l1.val if l1 else 0
            # 同理
            v2 = l2.val if l2 else 0
```

```
            # 计算两数之和，注意包括carry（上一次的进位）
            isum = v1 + v2 + carry
            # 求进位
            carry = isum // 10
            # 求余数
            isum = isum % 10
            # 当前指针指向新建的Node，里面包括了当前的余数
            cur.next = ListNode(isum)

            # 更新node信息：移动到下一位
            cur = cur.next
            l1 = l1.next if l1 else None
            l2 = l2.next if l2 else None

        # 返回dummy node的next，即目标的链表的第一个node
        return dummy.next
```

Ref: https://github.com/neetcode-gh/leetcode/blob/main/python/2-Add-Two-Numbers.py