1. Problem

- Reverse a linked list

Input: Head of a linked list.

Output: The reversed linked list.

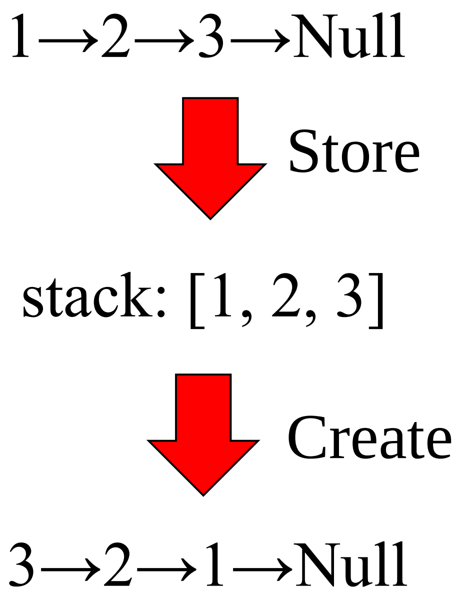
Example: Input: 1→2→3→4→Null
Output: 4→3→2→1→Null

	Time complexity	Space complexity
Store and create	O(n)	O(n)
Recursive method	O(n)	O(n)
Iterative method	O(n)	O(1)

1) Store and create

Pseudocode:

```
reverseList (head)
Input: Head of a linked list
Output: The reversed linked list
stack ← [ ]
while head != null do
    stack.push (head.val)
    head ← head.next
new_head ← ListNode (stack.pop(), null)
node ← new_head
while stack != null do
    node.next ← ListNode (stack.pop(), null)
    node ← node.next
return new_head
```



1→2→3→Null

Store

stack: [1, 2, 3]

Create

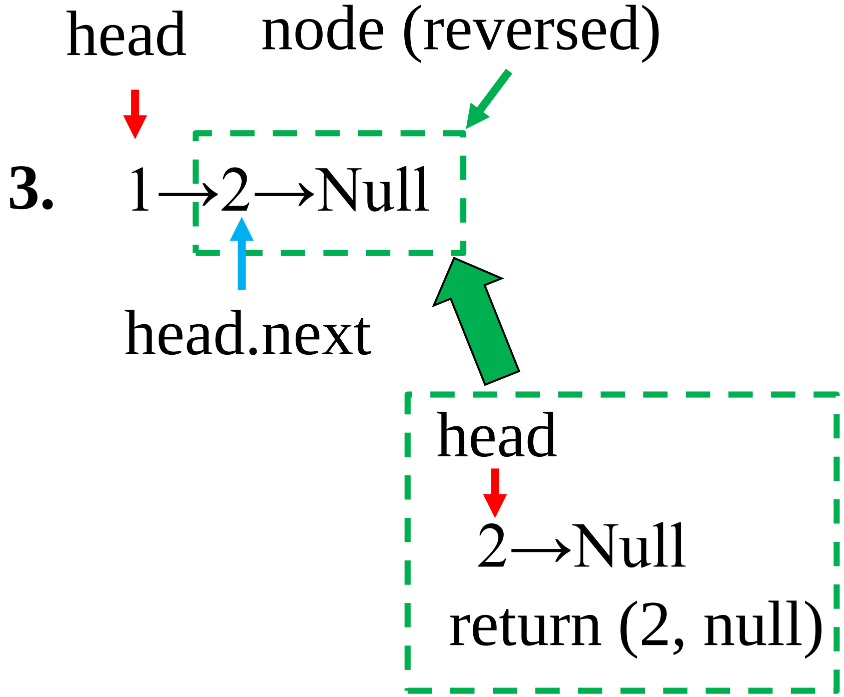
3→2→1→Null

Time complexity: O(n)   Space complexity: O(n)

2) Recursive method

Pseudocode:

```
reverseList (head)
Input: Head of a linked list
Output: The reversed linked list
1.  if head = null or head.next = null do
2.      return head
3.  node ← reverseList (head.next)
4.  head.next.next ← head
5.  head.next ← null
6.  return node
```



4 & 5. Null←1←2

Time complexity: O(*n*)

Space complexity: O(*n*)

Reverse a linked list

3) Iterative method

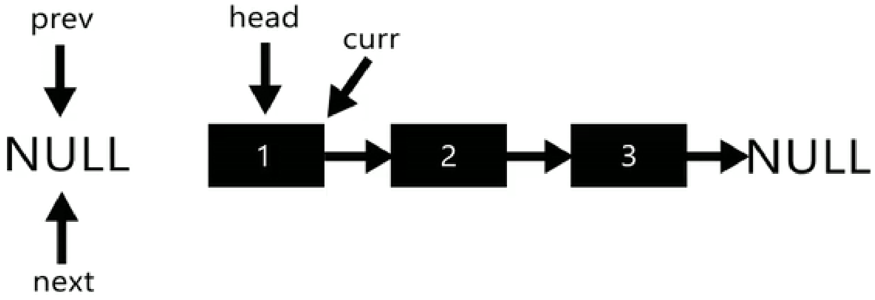
Pseudocode:

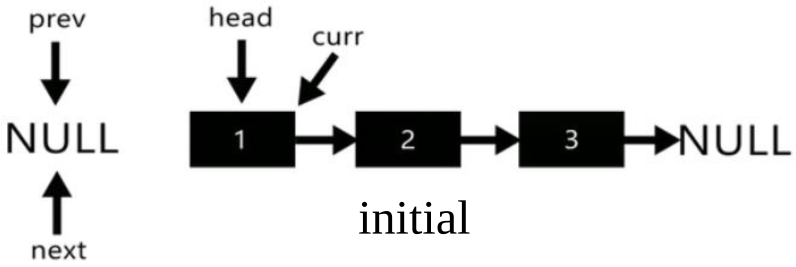
```
reverseList (head)
Input: Head of a linked list
Output: The reversed linked list
curr ← head; prev ← null; next ←null
while curr != null do
    next ← curr.next
    curr.next ← prev
    prev ← curr
    curr ← next
return prev
```

Time complexity: O(*n*)

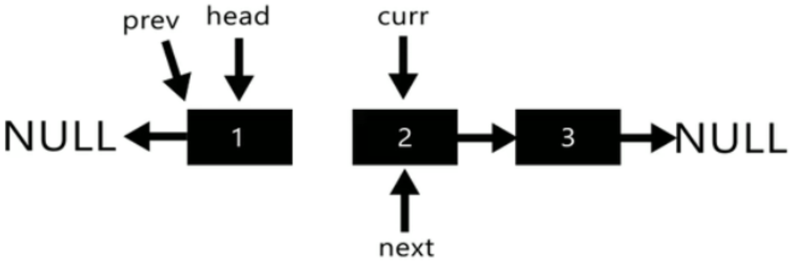
Space complexity: O(1)

change the current node's next pointer to point to its previous element





initial



After 1 loop

https://www.geeksforgeeks.org/reverse-a-linked-list/

3. Summary

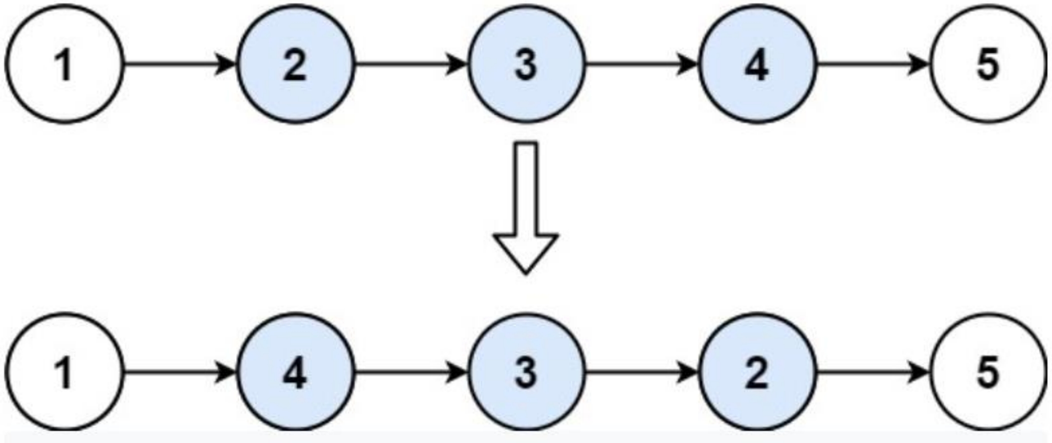
	Time complexity	Space complexity
Store and create	O(n)	O(n)
Recursive method	O(n)	O(n)
Iterative method	O(n)	O(1)

- Reverse a linked list II

Input: Head of a linked list. 2 integers left and right (positions).

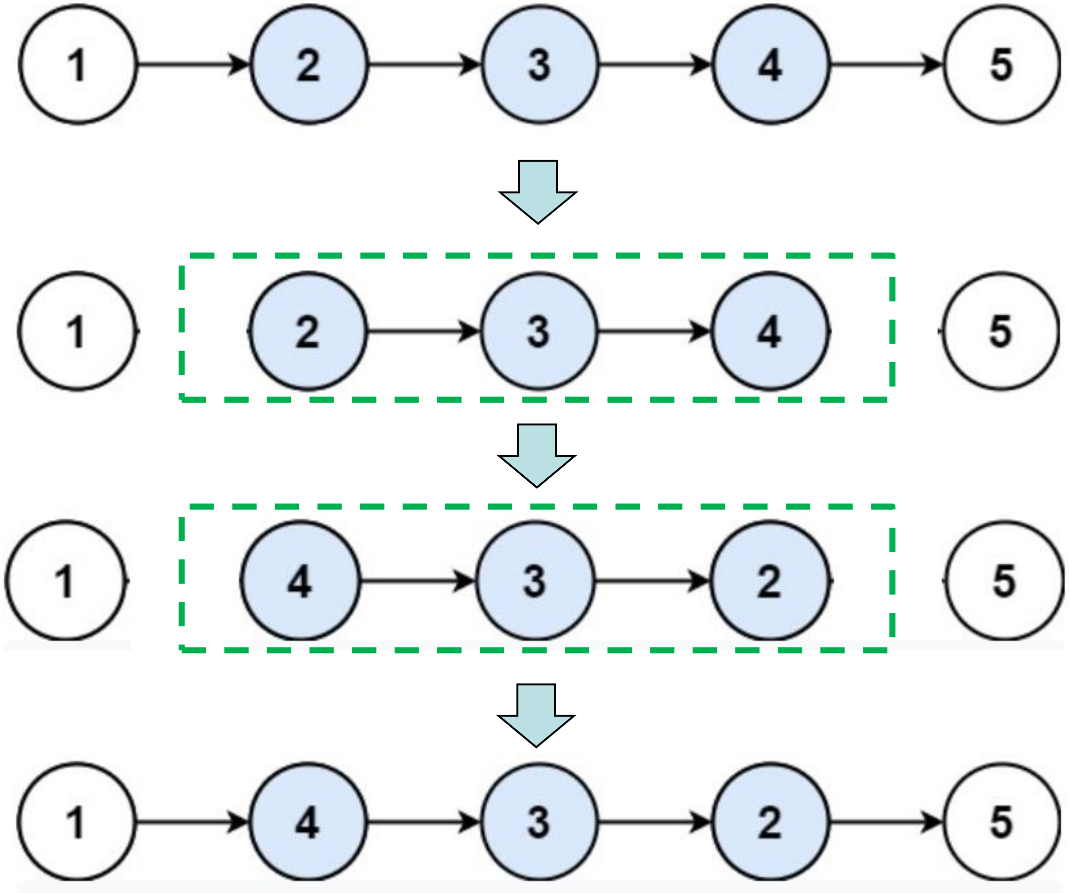
Output: The reversed linked list from position left to right.

Example:



left = 2, right = 4

Intuition:



left = 2, right = 4