GROUP MEMBERS

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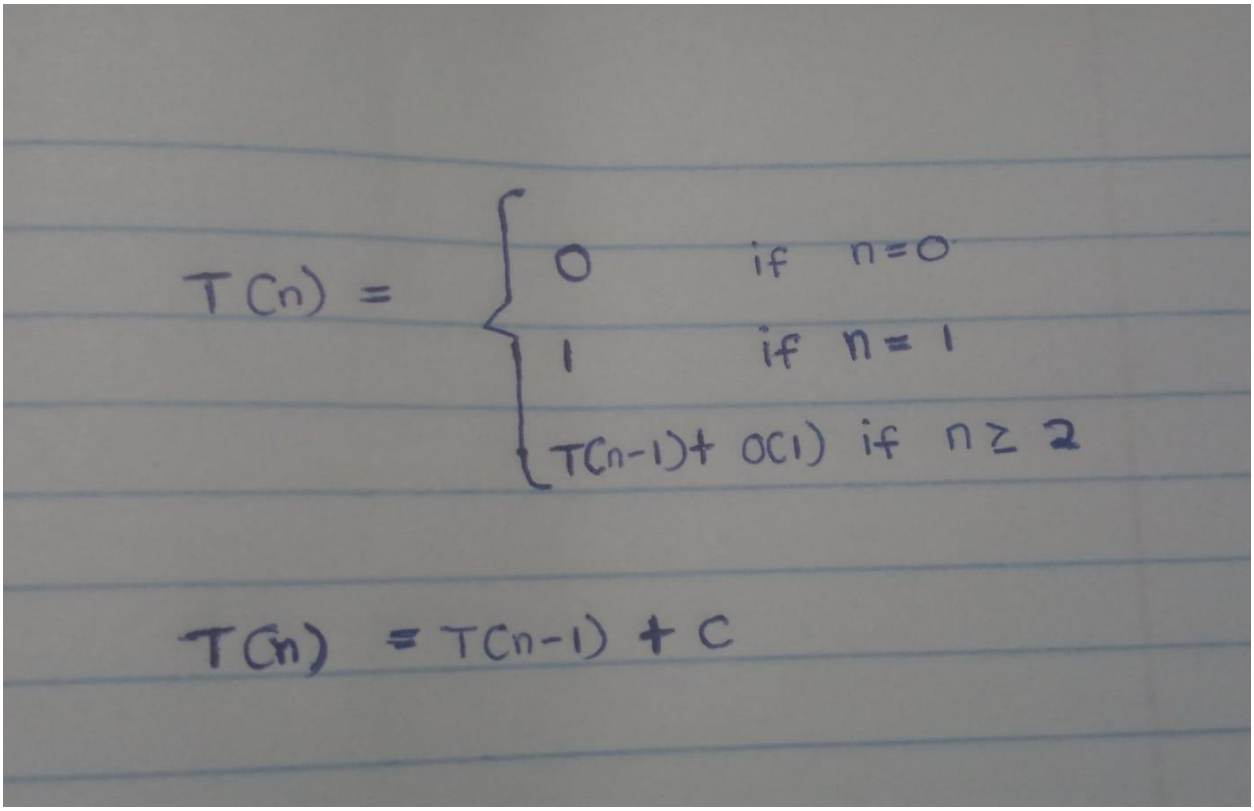
QUESTION

Design an algorithm to merge two sorted lists that are passed as parameters, and return one merged sorted list.

```
function merge_sorted_lists(list_one, list_two):

 merged_list = []
 i = 0
 j = 0

 while i < len(list_one) and j < len(list_two):
  if list_one[i] <= list_two[j]:
   merged_list.append(list_one[i])
   i += 1
  else:
   merged_list.append(list_two[j])
   j += 1


 while i < len(list_one):
  merged_list.append(list_one[i])
  i += 1


 while j < len(list_two):
  merged_list.append(list_two[j])
  j += 1

 return merged_list
```

Derive a recurrence relation for this algorithm.



Estimate time and space complexities for the same algorithm.

Time complexity

O(n) as all elements are compared and appended exactly once.

Space complexity

The primary data structure used is the merged_list, which stores the combined elements of the input lists. The merged_list will contain all *n* elements. Hence, the space complexity is **O(n)**.