PROBLEM 6

Union and Intersection of Two Linked Lists

In this problem I have used-

1. Dictionary: To store all unique elements and common elements in two link list
2. LinkList: For which we need to find union and intersection.

Algorithm:

1. Union:
    1. Create an empty dictionary
    2. For all elements in both the list if it does not exist in dictionary then add it to dictionary and if elements already present in dictionary then skip that element.
    3. Dictionary is used over here because it has O(1) complexity to check if any element is present in dictionary it takes O(1) complexity.
    4. Finally create a link list with the elements of dictionary.
2. Intersection:
    1. Create two empty dictionary one for unique elements of list 1 and other for common elements of both the list
    2. For all elements in list 1 if it does not exist in dictionary then add it to dictionary 1 and if elements already present in dictionary 1 then skip that element.
    3. For all elements in list 2 if exist in dictionary 1 (i.e my list 1) and does not exist in dictionary 2 (common elements) then add the element to common elements dictionary.
    4. Dictionary is used over here because it has O(1) complexity to check if any element is present in dictionary it takes O(1) complexity.
    5. Finally create a link list with the dictionary of common elements.

Time Complexity Analysis:

- Union: O(n) where n= size of list 1 +size of list 2
- Intersection: O(n) where n=size of list 1 +size of list 2

Space Complexity Analysis:

- Space to store dictionary 1: O(no. of unique elements in both list)
- Space to store dictionary 2: O(no. of common elements in both list)