

# Homework # 6

## Part I: Theory & Practice

1. Read Ch 11 and Ch 12.
2. Practice Problems: R11.5, R11.9, R11.13, P11.1, P11.5, P11.11, R12.7, P12.1, P12.7, P12.14 ( not collected )

## Part II : Programming

3. Coding Exercise (20 points ).

Using good coding practices, design your own Linked List of `int` types. It will consist of classes `List`, `Node`, and `Iterator` granting friendship and defining functions as needed. Write constructors, destructors, and all necessary member functions such as `insert`, `erase`, increment and decrement operators, `operator*` to dereference, as well as `operator==` and `operator!=` to check whether two iterators are pointing to the same element. You will then use this list to write the following member functions :

- (1) `List::reverse` to reverse your nodes
- (2) `List::push_front` to add a value to the beginning of a list
- (3) `List::sort` to sort the elements of a linked list (without copying them into a vector or another data type)
- (4) `List::merge` which accepts another `List` object and merges the two lists into one, alternating elements from each list such that merging 1 7 12 and 8 3 11 2 2 1 yields the list 1 8 7 3 12 11 2 2 1.

Write a main function to test your list such that it follows the output shown in Figure 1. Compile your code and run your program to check for compile-time errors and logic errors. Submit your header files and source codes to `ccl.e.ucla.edu` in separate files.

```
Please input a set of nonnegative numbers for a List
(Enter -1 when you are finished):

1 7 19 44 65 3
-1
Your list is
(1,7,19,44,65,3)

Select an index for insertion (enter -1 when finished): 3
Select a value for insertion: 58
Select an index for insertion (enter -1 when finished): -1

The augmented List is
(1,7,19,58,44,65,3)

When we sort the previous list we obtain
(1,3,7,19,44,58,65)
And this sorted list in reverse order is
(65,58,44,19,7,3,1)
If we merge this list with the list (2,3,5,7,11) we obtain
(65,2,58,3,44,5,19,7,7,11,3,1)
```

Figure 1: Hmw #6 sample output.