1 Boxes and Pointers

Draw a box and pointer diagram to represent the IntLists after each statement.

IntList L = IntList.list(1, 2, 3, 4);
IntList M = L.tail.tail;
IntList N = IntList.list(5, 6, 7);
N.tail.tail.tail = N;
L.tail.tail = N.tail.tail.tail.tail;
M.tail.tail = L;

2 Reverse

Implement the following method, which reverses an IntList non-destructively.

```java
/** Non-destructively reverses an IntList L. Do not modify the original
 * IntList. */
 public static IntList reverseNondestructive(IntList L) {
```

Extra: Implement the following method which destructively reverses an IntList L.

```java
/** Destructively reverses an IntList L. */
 public static IntList reverseDestructive(IntList L) {
```
3 Insertion

Implement the following method to insert an element into the given position of an IntList. This method should modify the original list L and should not create an entirely new list.

```java
/** Insert a new item at the given position in L and return the resulting IntList. If the position is past the end of the list, insert a new node at the end of the list. For example if L is (1, 2, 4) then the result of insert(L, 3, 2) would be (1, 2, 3, 4) */
public static IntList insert(IntList L, int item, int position) {
```

4 Extra: Shifting a Linked List

Implement the following methods to circularly shift an IntList to the left destructively.

```java
/** Destructively shifts the elements of the given IntList L to the left by one position (e.g. if the original list is (5, 4, 9, 1, 2, 3) then this method should return the list (4, 9, 1, 2, 3, 5)). Returns the first node in the shifted list. * Don’t use ‘new’; modify the original IntList. */
public static IntList shiftListDestructive(IntList L) {
```