

Lab 4 Solutions

Problem 1. InsertionSort and BubbleSort are stable. SelectionSort is not.

SelectionSort is *not* stable. Example:

(4, a), (4, b), (2, c)

After first iteration of outer loop, this becomes

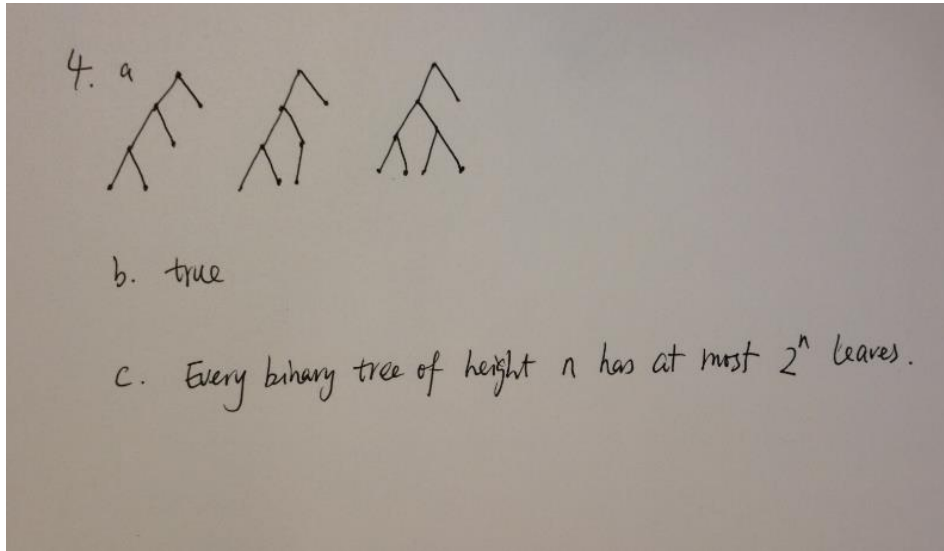
(2, c), (4, b), (4, a)

No other swaps occur in the rest of the execution. But now (4,b) and (4,a) have changed their relative positions.

Problem 3.

See MergeSortPlus.java

Problem 4.



Problem 5. Solve the following problem with a recursive algorithm: Given a list with n elements, put the elements of the list in reverse order. Compute the running time of your algorithm (hint: count self-calls).

```
public static <T> List<T> reverse(List<T> list){
    if(list == null || list.size() < 2) return list;
    T c = list.remove(0);
    reverse(list);
    list.add(c);
    return list;
}
```

The algorithm reverse makes $(n-1)$ self calls, and running time is proportional to number of self-calls. So the running time is $\theta(n)$ (Assume remove and add operations takes $O(1)$.)