

## Assignment 11b

Implement problem A, B, and C below in Java and submit by tomorrow:

**Submit only the source program, no .class files or anything else; it can all be in one .java file or in three separate files. With the source code, a status report (how much was finished of A, B, C) should be submitted that includes answers to the questions (1, 2, and 3) below.**

A. Write a Java program to implement a recursive version of the following function to compute an element of the Fibonacci sequence which is defined as follows (include a counter of the number of recursive calls made):

$\text{Fib}(0) = 0$

$\text{Fib}(1) = 1$

$\text{Fib}(n) = \text{Fib}(n-1) + \text{Fib}(n-2)$

B. Implement a memoized version of Fib. In the memoized version, you can store the elements of the sequence in any data structure with efficient access capability. Include a counter of the recursive calls made by your algorithm.

C. Implement Fib(n) that uses a two element array (or two variables) to store the previously computed values (if you have time).

1. How many recursive calls are made by the **non-memoized** brute force version for computing Fib(30)?
2. How many recursive calls are made by the **memoized** version for computing Fib(30)?
3. Compare the two versions (based on the resulting counts). Briefly explain why the brute force algorithm needs to use some form of dynamic programming?