

**CS2402**  
**Spring 2009**  
**Lab 1**

Due Friday, January 30, 2009

1. Fibonacci numbers and complexity

Fibonacci numbers are defined recursively as follows:

$$F(n) = n, \text{ for } n \leq 1$$

$$F(n) = F(n-1) + F(n-2) \text{ for } n > 1$$

Your assignment consists of writing the following methods to compute  $F(n)$ :

- a) A  $O(2^n)$  method based on the recursive definition
- b) A  $O(n)$  method that uses a loop
- c) A  $O(1)$  method that uses the closed form solution

Conduct experiments to compare the running times of your methods and verify that they behave as expected.

2. Implement a  $O(1)$  solution to problem E3.15 from the textbook. You are allowed to use at most  $O(n)$  preprocessing time prior to start processing queries (each of which has to be answered in  $O(1)$  time).