CS 1050B: Constructing Proofs

Problem Set 3 :

Due Monday, Oct 9th, after the class

1. **Problem 1 : Rosen 7.1: 8**

   Find the solution to each of these recurrence relations with the given initial conditions. Use an iterative approach such as that used in Example 5.

   a) $a_n = -a_{n-1}, a_0 = 5$
   b) $a_n = a_{n-1} + 3, a_0 = 1$
   c) $a_n = a_{n-1} - n, a_0 = 4$
   d) $a_n = 2a_{n-1} - 3, a_0 = -1$
   e) $a_n = (n+1)a_{n-1}, a_0 = 2$
   f) $a_n = 2na_{n-1}, a_0 = 3$
   g) $a_n = -a_{n-1} + n - 1, a_0 = 7$

2. **Problem 2 : Rosen 7.3: 8**

   Suppose that $f(n) = 2f(n/2) + 3$ when n is even, and $f(1) = 5$. Find

   a) $f(2)$
   b) $f(8)$
   c) $f(64)$
   d) $f(1024)$

3. **Problem 3 : Rosen 7.3: 20**

   a) Set up a divide-and-conquer recurrence relation for the number of modular multiplications required to compute a^n **mod** m, where a, m, and n are positive integers, using the recursive algorithms from Example 3 in Section 4.4.
   b) Use the recurrence relation you found in part (a) to construct a big-O estimate for the number of modular multiplications used to compute a^n **mod** m using the recursive algorithm.

Survey (Feedback)

1. How did you find this homework? Too easy? Too difficult? Just right?
2. How do you like the teaching so far? Too slow? Too fast? Just right? Any suggestions?