CAS CS 131 - Combinatorial Structures
Spring 2013

PROBLEM SET #7 (ASYMPTOTIC NOTATION AND RECURRENCES)
OUT: FRIDAY, MARCH 29
DUE: THURSDAY, APRIL 4

NO LATE SUBMISSIONS WILL BE ACCEPTED

To be completed individually.

1. Show that $\sum_{k=0}^{n-1} 7^k = O(7^n)$.

2. Solve the following recurrences:

   - $T(n) = 3T(n-1) - 2T(n-2), T(0) = 0, T(1) = 1$.
   - $T(n) = 5T(n-1) - 8T(n-2) + 4T(n-3), T(0) = 0, T(1) = 1$ and $T(2) = 2$.

3. Use substitution to solve the recurrence equation $a_n = a_{n-1} + n^2$ for $n \geq 1$, given $a_0 = 7$.

4. Use substitution to solve the recurrence: $T(n) = T(n-a) + T(a) + n$.

5. Solve the following linear recurrences:

   - $f(n) = f(n-1) + 6f(n-2), f(0) = 3, f(1) = 6$
   - $f(n) = 2f(n-1) - f(n-2), f(0) = 4, f(1) = 1$
   - $f(n) = 2f(n-1) + f(n-2) - 2f(n-3), f(0) = 3, f(1) = 6, f(2) = 0$
   - $f(n) = 5f(n-2) - 4f(n-4), f(0) = 3, f(1) = 2, f(2) = 6, f(3) = 8$