

**Computer Science 341**  
**Discrete Mathematics**

Problem Session 5

October 21, 2002

Problem 1

Solve the following recurrence relations:

a.  $T(n) = 7 \cdot T(n/2) + n^2$ ,  $T(1) = 1$

b.  $T(n) = 2 \cdot T(n/2) + (n/\log n)$ ,  $T(2) = 1$

Problem 2

Solve the following recurrence relations using the “particular + homogeneous” solution method:

a.  $a_n - 5 \cdot a_{n-1} + 6 \cdot a_{n-2} = 3 \cdot n + 2$ ,  $a_0 = \frac{17}{2}$ ,  $a_1 = \frac{57}{4}$ .

b.  $a_n + a_{n-1} - 2 \cdot a_{n-2} = 9 \cdot n^2 + 3 \cdot n - 7$ ,  $a_0 = 4$ ,  $a_1 = 8$ .

c.  $a_n + a_{n-1} - 12 \cdot a_{n-2} = n + 3^{n-1} + 2^n$ ,  $a_0 = \frac{1}{3}$ ,  $a_1 = \frac{2}{3}$ .

Problem 3

How many  $n$ -digit ternary sequences with an even number of 0s and an even number of 1s are there?

Problem 4

Find the number of  $n$ -term sequences consisting of letters  $a$ ,  $b$ ,  $c$ ,  $d$  such that  $a$  is never adjacent to  $b$ .