22C:44 Homework 3

Due by 5 pm on Thursday, Sept 21, 2000

Each problem is worth 10 points.

1. (a) Use the iteration method to solve the following recurrence.

$$T(n) = T(n-1) + 2n - 3.$$

   Then verify your answer using the substitution method. Make sure that your answer is expressed in the Θ-notation.

   (b) Solve the following recurrence

$$T(n) = T(n/4) + (\sqrt{n} + 1)$$

   and express your answer in the Θ-notation.

2. Problem 6.4-6 from the textbook. Here are some additional hints. Let H_R, T_R, H_G, and T_G denote the number of heads and tails obtained by Professors R and G respectively. As suggested by the hint in the textbook call the heads and tails obtained by Professor R successes and failures respectively and call the heads and tails obtained by Professor G failures and successes respectively. Let S_R, F_R, F_G, and S_G denote the number of successes and failures of Professors R and G respectively. Then

$$\begin{aligned} Prob[H_r = H_G] &= Prob[S_R = F_G] \\ &= Prob[S_R = n - S_G] \\ &= Prob[S_R + S_G = n] \end{aligned}$$

   This is one way to start solving the problem.

   To verify the identity in the problem consider separately for each $i = 0, 1, \ldots, n$ the possibilities that R and G toss exactly i heads.

3. Problem 6.2 from the textbook.

4. Problems 7.1-1, 7.1-4, 7.1-5, and 7.3-1 from the textbook.
