COS 341, Oct 13, 1999
Due: October 20, 1999

Homework Set 4

Reading Assignments Start reading Chapter 7.

Written Assignments

Do exercises 18 and 20 in Section 5.7.

Do the following problems:

Special Problem 1 (counted as 1 exercise) Evaluate \( \sum_{1 \leq k \leq n} k \delta^k(n) \).

Special Problem 2 (counted as 1 exercise) Show that

\[
\sum_{0 \leq k \leq n} \frac{(2n)!}{(k!)^2((n-k)!)^2} = \left( \frac{2n}{n} \right)^2.
\]

Special Problem 3 (counted as 2 exercises) Consider a sequence of 2n distinct people in a line at a cashier. Suppose n of the people pay $1 and n of the people get $1. Show that the number of arrangements in which the cashier never goes in debt (i.e., at every stage at least as many people have paid in $1 as were paid out $1) is equal to \( \left( \begin{array}{c} 2n \\ n \end{array} \right) - \left( \begin{array}{c} 2n \\ n+1 \end{array} \right) \). Hint: Show a one-to-one correspondence between sequences where at some stage the cashier goes at least $1 in debt and all sequences of 2n people in which n + 1 of the people pay $1.