Institut for Matematik og Datalogi
Syddansk Universitet

March 25, 2002
JFB and KM

Discrete Mathematics with Applications
F02 – Lecture 8

Lecture, March 18

We continued to study counting techniques by analyzing the Pigeonhole principle (section 4.2) and permutations of sets with indistinguishable objects (section 4.6). Then we turned to the principle of inclusion and exclusion (section 5.5).

Lecture, March 25

The next technique we study is the solution of linear recurrence relations. We introduce the Fibonacci numbers as solution of a recurrence relation of degree two. We shall mainly concentrate on solving such degree two recurrence relations (sections 5.1 and 5.2).

Lecture, April 8

We'll start to lecture on discrete probability theory. We shall define sample spaces, events and elementary events as well as the axioms of discrete probability distributions and study their properties.

Note: There will be no exercises on Tuesday, April 2.

Problems to be discussed April 9

- Problems 4 a),b),c) from Section 5.2
- Let $f : \mathbb{N} \mapsto \mathbb{R}$ be given by $f(n) := 3 \cdot 2^n - 8^n$ for all $n \in \mathbb{N}$ (i.e. $n \geq 1$).

a) Compute the initial values $f(1)$ and $f(2)$.

b) Show that f satisfies a recurrence relation of the form

$$f(n) \ = \ c_1 \cdot f(n-1) + c_2 \cdot f(n-2) \ .$$

Compute c_1 and c_2.

We shall as well discuss some of the remaining problems from Lecture Note 7 if there is sufficiently much time left.

Maple problems

Use Maple to solve once again Problem 20 of Section 4.6., but this time requiring that all variables x_1, x_2 and x_3 should get as value a natural number (i.e. assignments with $x_i = 0$ are forbidden. Compute both the number of assignments which give a sum less than 11 and those where the sum equals 11.

Third required assignment

Rules are the same as before. Solutions must be turned in by Monday, April 22 at 10:15h. Solutions handed in later will not be accepted.

- Problem 6 from Section 5.5
- Problem 10 from Section 5.6
- Solve Problem 4, parts d), e) and f) from Section 5.2.
- Solve Problem 42 from Section 5.2 (use induction; the f_i's denote the Fibonacci numbers).