

## Randomized Algorithms (DM839) — Ugeseddel 10

**NB: new schedule for 4th quarter** We now have a new (4. quarter schedule). As I will hand out the exam problems already Wednesday 9 and not Thursday as previously announced), there will be no classes in the period April 10 to May 12 inclusive.

**Note that, again contrary to previous message, we will have class Monday April 7 at 8.15!**

**Stuff covered in week 14** Sections 5 and 6 in the above paper by Alon et al.

**Classes Monday, April 7, 2014** We will discuss the following exercises

- MU 6.3 and 6.14
- MU 7.6
- Consider the weather during a number of days as a stochastic process with the only possible states 0 : sun and 1 : rain. We assume for simplicity that the process is a Markov chain with transition matrix

$$P = \begin{pmatrix} 0.7 & 0.3 \\ 0.2 & 0.8 \end{pmatrix}$$

- Find the probability that a rainy day is followed by a sunny.
  - Formulate in words the event  $X_{62} = 1$ .
  - Find the conditional probability  $Pr(X_{62} = 1 | X_{61} = 0)$ .
  - Find the probability that a rainy day is followed by two sunny days.
  - Find  $Pr(X_{62} = 1 | X_{60} = 0)$ .
  - If Friday is sunny, what is the probability that the next following Sunday is also a sunny day?
- The weather changes at a tourist resort from one day to the next can somewhat simplified be described as a Markov chain with the three states:  
 $E_1$  : sun,  $E_2$  : clouds,  $E_3$  : rain.

Using weather statistics of the area the following transition probability matrix has

been estimated:  $P = \begin{pmatrix} 0.6 & 0.2 & 0.2 \\ 0.3 & 0.5 & 0.2 \\ 0.7 & 0.0 & 0.3 \end{pmatrix}$

A vacationer intends to visit the resort during the period December 24-26. Under the assumption that there is still a lot of time before Christmas, derive the probability

- (a) that there will be three sunny days in a row;
- (b) of no rain at least during the first two days.

- MU 13.1 and 13.5

**Classes Wednesday April 9, 2014** We will discuss the formulation of the exam problems and what I expect from you. The problems will be made available on the home page sometime Tuesday.