

## DM551 – Algorithms and Probability – 2018

### Lecture 18

#### Lecture, November 20

We finished chapter 32 on string matching in CLRS. Then we began on the Gambler's Ruin Problem from notes by Tom Leighton and Ronitt Rubinfeld, from MIT. See <http://web.mit.edu/neboat/Public/6.042/randomwalks.pdf>. The problem was just introduced.

#### Lecture, November 26

We will continue on the notes on the Gambler's Ruin Problem.

#### Lecture, December 3

We will finish the notes on the Gambler's Ruin Problem and discuss the exam. I may present something about online algorithms or cryptology.

#### Problems to be discussed on December 5

1. Exercises not covered yet.
2. CLRS: exercises 32.4-4. 32.4-5.
3. Explain, in your own words, why the recurrence relation at the bottom of page 2 holds. How do we change it to a linear homogeneous recurrence relation of the type we learned how to solve from chapter 8 in Rosen?
4. Explain, in your own words, why the result in the Gambler's Ruin problem is so different for  $p < 1/2$  and  $p = 1/2$ . Is this related to the characteristic equation?
5. In Theorem 2 of the notes on the Gambler's Ruin, the cases  $p = 0$  and  $p = 1$  are handled easily. How long does it take before the game ends in these two different cases?
6. At the top of page 6 of the notes, it says that for  $p \neq 1/2$ ,  $A = 0$ . Why is this true?
7. Where in the notes on the Gambler's Ruin problem could they have used Theorem 6 on page 506 of Rosen's textbook to solve nonhomogeneous linear recurrences?