S1G1 Seminar – SS2019

Thema: **Probleme und Knobeleien aus der Stochastik**

Reference: **40 Puzzles and Problems in Probability and Mathematical Statistics** by Wolfgang Schwarz (published by Springer)

Supervision: Prof. Patrik Ferrari, LWK 3.047

Zeit und Ort: Dienstag, 16-18, N0.007
Vorbesprechung: Dienstag, 22.01, 16:15, N0.003

Structure of the booklet:

Chapter 1: A list of short problems
Chapter 2: For each problem some hint on the solution
Chapter 3: For each problem the solution

Selected problems:

The problems for the seminar will be a (subset of)

1.3 Mean waiting time for 1-1 vs. 1-2
1.4 How to divide up gains in interrupted games
1.6 Sample size vs. Signal strength
1.9 Maximize your gain
1.13 Throwing the same vs. Different dice
1.17 How many donors needed?
1.20 Random powers of random variables
1.24 The lady tasting tea
1.29 Breaking the record
1.31 Attracting mediocrity
1.39 How many trials produced a given maximum?
1.40 Waiting for success

Two examples

1) Peter and Paula play a simple game of dice, as follows. Peter keeps throwing the die until he obtains the sequence 1-1 in two successive throws.
For Paula, the rules are similar, but she throws the die untl she obtains the sequence 1-2 in two successive throws.

Question: On average, will both have to throw the die the same number of times? If not, who will need to throw less?

2) To organize a charity event that costs 100€, an organization raises funds. Independently of each other, each donor after another gives some amound of money that is exponentiall distributed with mean 20€. The process is stopped as soon as 100€ or more has been collected.

Question: Find the distribution, mean, and variance of the number of donors needed until at least 100€ has been collected.