Fakultät MI, Fachrichtung Mathematik
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UNIVERSITÄT DES SAARLANDES

Mathematics for computer science 1

Winterterm 2019/20

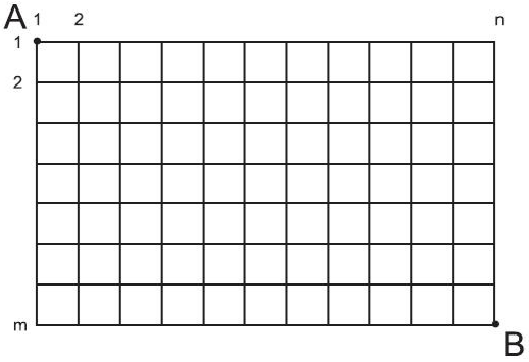
Hand in your solution sheet in the mailboxes (next to Zeichensaal U.39, building E2 5) by Nov. 13 **before the lecture**.

All exercise sheets and course information can be found at: www.math.uni-sb.de/ag/schreyer/

Sheet 3 06. November 2019

Exercise 1 (power sets)**.** Let M be an arbitrary set, and let 2^M be its power set. Show that there does not exist a bijective map between M and 2^M.

Exercise 2 (Paths in a city)**.** In an American city with n avenues and m streets which form equal sized squares (see the figure below) we want to walk from the vertex A to the vertex B. How many shortest paths exist?



Exercise 3 (The Chinese Shepherd)**.** A Chinese shepherd has a flock of less than 300 animals. In order to count them exactly, he lets them run through a gate in pairs in the evening and finds out that one animal remains. The next evening, he lets the animals run through the gate in groups of three and also notes that one animal remains. On the third evening, he does the same with groups of 5 sheeps and realizes that one sheep remains. Finally on the fourth evening, he sends groups of 7 sheeps through the gate, and 4 sheeps remain. How large is the flock?

Exercise 4 (Greatest common divisor)**.**

(a) Let $a = 2387$ and $b = 2079$. Without the use of a computer, calculate the greatest common divisor $d = \gcd(a, b)$ and the Bézout coefficients u and v, that is, find u and v such that $au + bv = d$.

(b) Let $a = 139651$ and $b = 111649$. Without the use of a computer, calculate the least common multiple of a and b.