Programming Exercises "Mathematical Modeling"

Sheet 1

Due: Wednesday 14.05.2025, 14:00, Per email at *eric.trebuchon@math.uni-freiburg.de* Please write your programm in **Octave** or **Python**

Please hand in as pairs of students

Exercise 1: (Infinite grid)

We want to analyse an electric network consisting of nodes on the each grid point \mathbb{Z}^2 , which are connected to their 4 closest neighbours by a resistor of resistance 1 Ω . Let there be a voltage source of 1V between the nodes (0,0) and (0,1). Compute the current between (0,0) and (0,1), by approximating this grid with larger and larger grids $\mathbb{Z}^2 \cap [-a, a]^2$ for $a = 2^k$, k = 1, 2, ..., 4.

(16 Points)