Mathematical Modelling in the Natural Sciences
SS16, Exercises, Sheet 6

Solutions to be presented on 29. April 2016

1. Implement the Monte-Carle simulation of pages 131 – 136 in the notes. Bonus: Prove that $\bar{I}(t) \to 0$, $t \to \infty$. (Solved by Filipe Martinho)

2. Show for $N = 2$ and $M = 1$ that the SIR model with diffusion on page 138 of the notes has a locally asymptotically stable equilibrium $(S_{i,j}, I_{i,j}, R_{i,j}) = (S_1^*, I_1^*, R_1^*)$ if $I_2^\star < 0$ and a locally asymptotically stable equilibrium $(S_{i,j}, I_{i,j}, R_{i,j}) = (S_2^*, I_2^*, R_2^*)$ if $I_2^\star > 0$. (Solved by Florian Thaler)

3. As on page 143 of the notes, implement an SIR model with two-dimensional diffusion and include any relevant effects, even such as loss of immunity, vaccination, etc. Use your model to develop an effective quarantine strategy. (Solved by Andreas Holm)