MATH / PUBH-EPI 5421
Lab #2

We are often interested in estimating the initial growth rate of an epidemic from incidence data. This is not as straight-forward as it might seem – some approaches and discussion are given in Ma et al [1]. One reasonably robust method is to fit the *logistic equation* to cumulative incidence. The purpose of this lab is to explore this method for estimating the growth rate of an epidemic.

L2.1. The Matlab file `estimatingGrowthRate.m` (on Carmen) generates synthetic data from an SIR model, and then attempts to recover the growth rate by fitting the logistic model to the cumulative weekly incidence. Run this script (you will also need `logistic.m` and `logsir.m`). How well does the method perform?

L2.2. Go through the code in `estimatingGrowthRate.m`, to understand how the code is working. How sensitive is the estimate of the growth rate to the chosen "fitting window" (the portion of the data that are used for fitting)? To the initial parameter values supplied for the logistic equation?

L2.3. The previous exercises use synthetic, noise-free data. What happens if noise is added to the data? Is the estimated growth rate robust to noise?

References

[1] J. Ma, J. Dushoff, B. M. Bolker, and D. J. D. Earn. Estimating initial epidemic growth rates. *Bulletin of Mathematical Biology*, 76:245–260, 2014.