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Lab 5: Epidemic Modeling I

1. In class, you simulate the dynamics of an SIR and SIS model. Create a plot of simulated dynamics of your SIS model and insert it here. Explain why the resulting graph is shaped differently from the SIR model you just made.
2. For the “epi” dataset given to you in class, use maximum likelihood to fit an SIR model to these data.
   1. What are your parameter estimates?
   2. How many susceptibles and infecteds start in the population at the beginning of the epidemic?
   3. What’s R0 of this epidemic?
   4. Simulate SIR dynamics of a model parameterized with your estimates. Plot the number of infecteds through time as a line graph, and then your actual data points over top. Insert that plot below.
3. Find a partner to work on your disease modeling project with, and together choose which disease you’ll be working with. For that diseases, come up with two or more aspects of its biology that may violate the assumptions of the SIR model.

1. Create a compartmental model diagram and associated system of equations describing your system that takes into account at least one of the aspects you talked about in the question above.
2. For the disease you chose to do your project on, find **two** primary articles modeling outbreaks of that disease. Write a 3-4 sentence summary of the main findings of each paper below.