

**22M:096:001**

**Epidemiology Module–Mini-Project Suggestions**

1. Use MATLAB to create and solve an SEIR model that will determine optimal immunization plan given the following parameters:
  - An average person has  $\beta = 10$  adequate contacts per day.
  - An average infected person is sick for 5 days.
  - The average lifespan (uninfected) is 75 years.
2. Determine a method test the sensitivity of the SIS and SIR models to the parameters  $\beta$ ,  $\gamma$ , and  $\mu$ . (You can do this explicitly for the SIS model, but should try other methods for SIR epidemic and endemic.) Prepare example simulations to support your conclusions.
3. Adapt the models from class in the following ways:
  - (a) Removing the constant population assumption from the SIS model, derive a new set of differential equations.
  - (b) Allow for people to die due to infection in your model from part (a).
  - (c) Repeat (a) and (b) for SIR endemic and SIR epidemic.

Run simulations using each of your models.