

Matlab HW2

Assume that in a remote village with 1526 residents. A couple (2 persons) contracted a flu. The epidemic spread rapidly, as shown in the following table:

time	0	1	2	3	4	5	6	7	8	9	10	11	12	13
infected	2	7	22	71	194	384	492	446	336	231	152	97	62	39

Assume that the parameter $\beta = 0.56$ in the SIR model for the data in the above table.

1. Use technology to determine an appropriate value of α that matches the data in the table (hint: use Section 2.7, Problem 4(a) to help you).
2. Draw the solution curves (both the solution curve on the phase plane and the graphs of $I(t), S(t)$). Determine numerically the total number of residents who caught the flu during the epidemic.
3. If 500 residents had been vaccinated before the disease started, how many people would be infected during the epidemic?
4. Assume that a new strain emerges that can infect those who have recovered from the previous strain. For each unit time, assume 4 percents of recovered people become susceptible again (see Section 2.7, Problem 6). By using the same α, β obtained from above, draw the solution curves and determine what is the fraction of the population that will remain infected as time goes to $+\infty$.