SIR Model With Limited Immunity

Group Report

Names: 1. 4.

2. 5.

3. 6.

Answer the following questions using complete sentences. Include calculations, extra sheets and computer generated graphs where needed.

1. (5 points) Write down the differential equations for $i(t)$ and $s(t)$ from the lab. Use these to construct recursion relations for Euler's method. Using $\Delta t = 1$ and the initial conditions $i(0) = .1$, $s(0) = .9$, compute $(s(n), i(n)$ for $n = 1, 2, 3, 4, 5$.

2. (5 points) Sketch the is-phase plane for the system of differential equations in 1) and plot the points you found using Euler's method. Compute the equilibrium point coordinates and plot it on the phase plane.

3. (5 points) Sketch graphs for $i(t)$ and $s(t)$ using the values you calculated in 2). Using the phase plane in your lab manual and the information about the equilibrium point, extend the graphs of $i(t)$ and $s(t)$ as you think they will behave as $t \to \infty$.

4. (5 points) Discuss the effect of changing λ while keeping β and μ fixed. In particular, sketch graphs of the is-phase plane, $i(t)$ and $s(t)$ in the two cases where λ is much smaller than β and where $\lambda > \beta$.