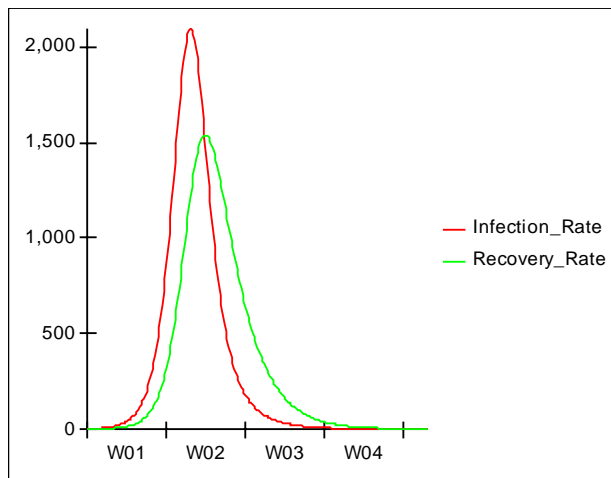
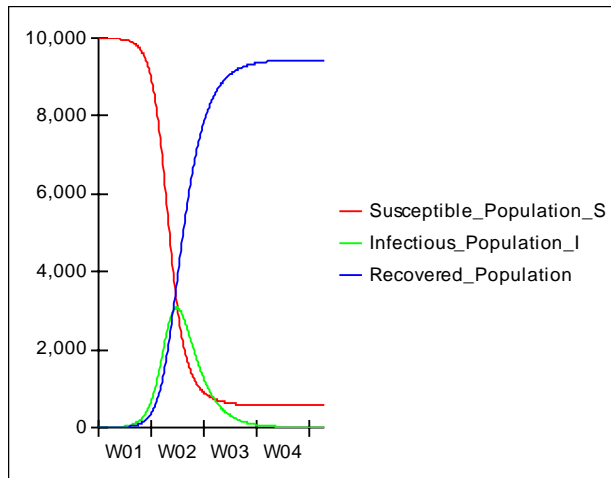
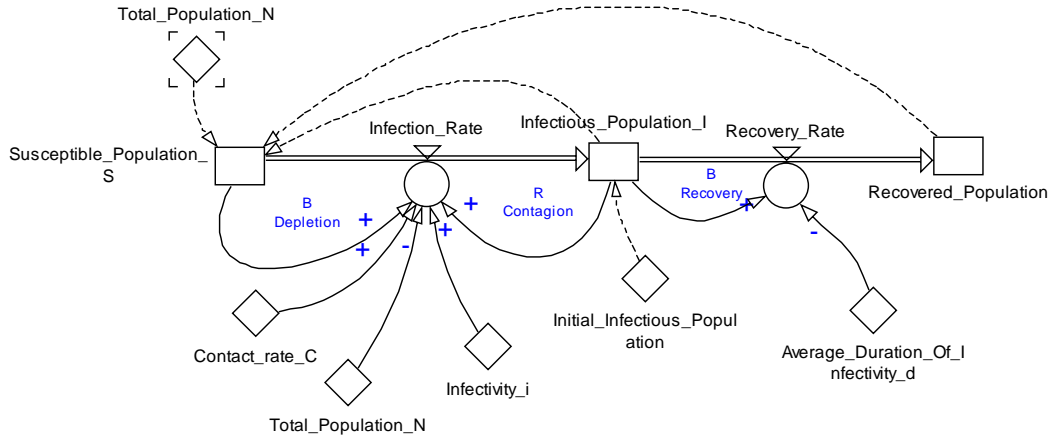
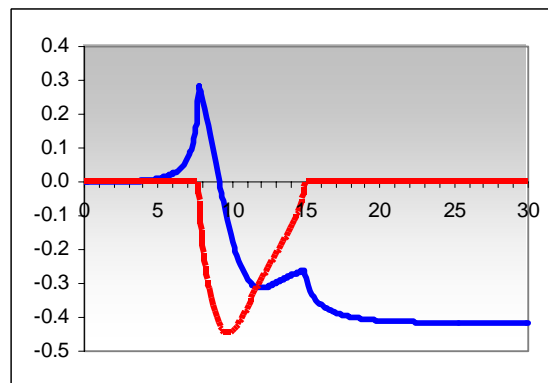
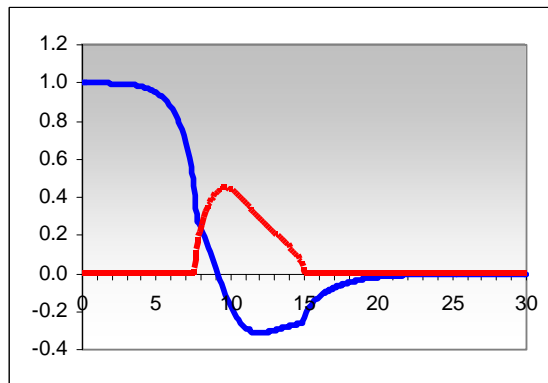
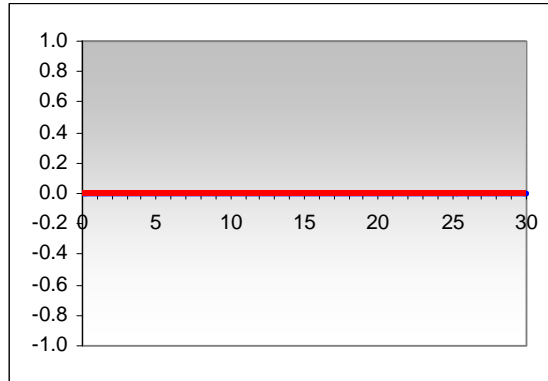


SIR.sim/Chapter 9 from Sterman's book



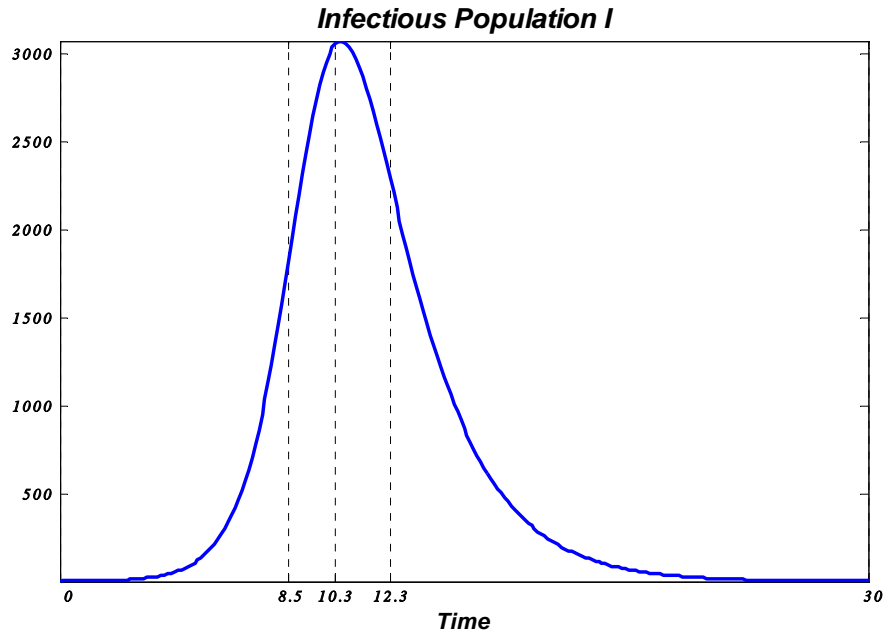
The Eigenvalues Trace vs. Time

The Red lines express the real values while the blue express the Imaginary values of the eigenvalues.



Loop 1:
 Infectious_Population_I --> Infection_Rate
Loop 2:
 Infectious_Population_I --> Recovery_Rate
Loop 3:
 Susceptible_Population_S --> Infection_Rate

The Level of interest: **Infectious_Population_I**



As it can be seen from the graph above; only 4 time steps might be important to study:

- a) 4.25
- b) 9.375
- c) 11.25
- d) 21.125

Independent loops' elasticity values:

Time instant 4.25:

The dominant eigenvalue is: 0.97552, with percentage contribution: 100%.

Loop 1 (Polarity: 1): 1.5317
 Loop 2 (Polarity: -1): -0.51904
 Loop 3 (Polarity: -1): -0.012679

Time instant 9.375:

The dominant eigenvalue is: -0.057821-0.44189i, with percentage contribution: 100%.

Loop 1 (Polarity: 1): 5.5511e-017+0.88436i
Loop 2 (Polarity: -1): 0.5-0.50033i
Loop 3 (Polarity: -1): 0.5-0.38403i

Time instant 11.25:

The dominant eigenvalue is: -0.29932-0.35468i, with percentage contribution: 100%.

Loop 1 (Polarity: 1): 2.7756e-017+0.46823i
Loop 2 (Polarity: -1): 0.5-0.28291i
Loop 3 (Polarity: -1): 0.5-0.18532i

Time instant 21.125:

The dominant eigenvalue is: -0.41219, with percentage contribution: 100%.

Loop 1 (Polarity: 1): -0.21419
Loop 2 (Polarity: -1): 1.2197
Loop 3 (Polarity: -1): -0.0054762

Independent loops' elasticity values (Sorted):

Time instant 4.25:

The dominant eigenvalue is: 0.97552, with percentage contribution: 100%.

Loop 1 (Polarity: 1): 1.5317
Loop 3 (Polarity: -1): -0.012679
Loop 2 (Polarity: -1): -0.51904

Time instant 9.375:

The dominant eigenvalue is: -0.057821-0.44189i, with percentage contribution: 100%.

Effect on the Envelope:

Loop 1 (Polarity: 1): 0.87688
Loop 3 (Polarity: -1): -0.44566
Loop 2 (Polarity: -1): -0.56097

Effect on the Frequency:

Loop 1 (Polarity: 1): -0.11474
Loop 2 (Polarity: -1): -0.43086
Loop 3 (Polarity: -1): -0.44595

Time instant 11.25:

The dominant eigenvalue is: $-0.29932-0.35468i$, with percentage contribution: 100%.

Effect on the Envelope:

Loop 1 (Polarity: 1): 0.35784
Loop 3 (Polarity: -1): -0.4641
Loop 2 (Polarity: -1): -0.53868

Effect on the Frequency:

Loop 2 (Polarity: -1): -0.19966
Loop 3 (Polarity: -1): -0.2626
Loop 1 (Polarity: 1): -0.30198

Time instant 21.125:

The dominant eigenvalue is: -0.41219 , with percentage contribution: 100%.

Loop 2 (Polarity: -1): 1.2197
Loop 3 (Polarity: -1): -0.0054762
Loop 1 (Polarity: 1): -0.21419