Math 304 – Project
Due: Thursday, December 3, 2009

**Goal:** Study of one particular model in greater depth, including numerical simulation for a set of parameter values. Turn in a written report that includes a description of the model, the numerical results and any computer programs that you have written, and a short discussion of your results. The models can be taken from a textbook, as long as it is not a model that we have discussed in detail in class, or from the list of references below. You may select a model from another source or even a model of a non-biological system, as long as you discuss it with me first.

**Part 1. Description of the model:**
Give a short introduction to the biological system that is being modeled. Be sure to include any specific questions about the biological system that the model was developed to study. Describe the model equations in detail. State all the assumptions that were made in developing the model. Explain what the variables and parameters represent. Include a table with parameter values if one is given in the paper.

**Part 2. Simulation of the model:**
Use Matlab or similar software to solve the model equations for a set of parameter values. If experimentally measured parameter values are available use those. Otherwise pick a reasonable set of parameter values (that is, ones that satisfy the model assumptions). Be sure to list the values you used. Plot the solutions of the model equations vs time (either discrete or continuous). Turn in the plots of the model solutions and a listing the computer code for your simulations. If you don’t use Matlab, include additional explanatory comments with the code.

**Part 3. Further exploration of the model behavior:**
Use either simulation or analytic methods to further explore the behavior of the model. For example, you could: 1) reproduce an additional result from the paper; 2) plot the phase plane (2 dimensional models or a subsystem of higher dimensional models) of the model; 3) determine the stability of steady-states, 4) investigate how solutions depend on the value of a parameter or 5) modify the model equations so that the model applies to a new situation and simulate the modified model. Turn in plots and computer code for any simulations, and a neat write up of any analytical results.

**Part 4. Discussion of your results:**
Give a brief discussion of your results. What did your results tell you about the model and its behavior? Were there any particular problems you encountered in simulating the model? How did you overcome them? Do you think the model does a good job of reproducing the behavior of the biological system or does it have pathological behavior?
References: