Plotting the bifurcation diagram gives us
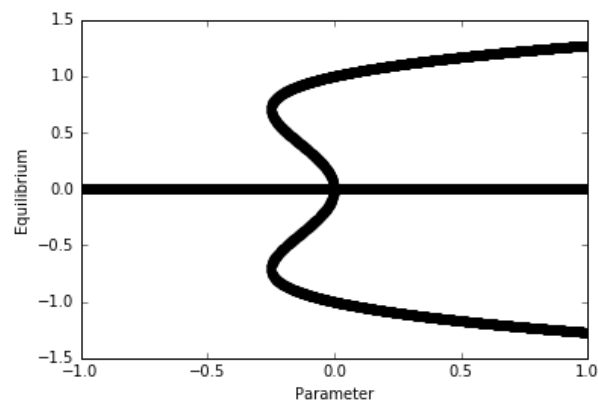

Figure 1: The bifurcation diagram

Our heuristic solutions of 3 stable equilibria and 2 unstable is valid in the numerical plots.
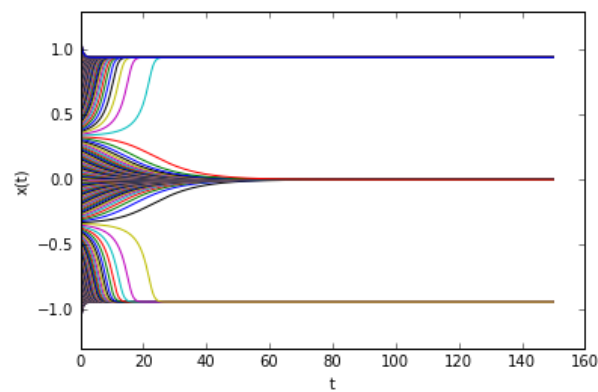

Figure 2: x(t) for different initial conditions

This is an interesting problem to solve numerically. If the time step is not small enough (cfl is not sufficient !), we get plots like the one below, which violates uniqueness.
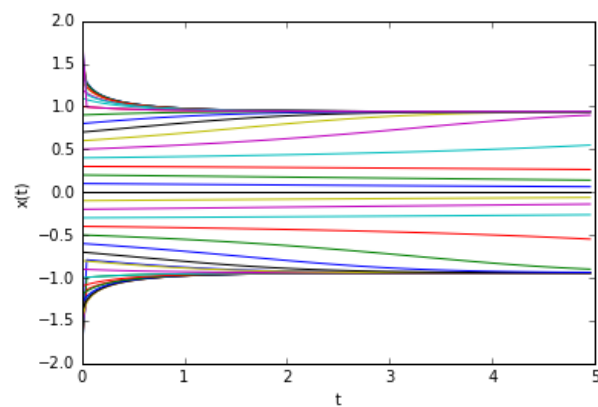

Figure 3: x(t) for different initial conditions