Math 5110: Homework Assignment 5
Due Sep 26, 2017

1. Consider the Nicholson-Bailey model in the case that each parasitoid produces c offspring rather than just one as in the standard equations. Find the equilibria and their stability. Can low parasitoid reproduction stabilize the equations?

2. Suppose that a population of hosts and parasitoids follow the Nicholson-Bailey equations but that each year a fraction p of the hosts have a safe refuge from attack.

   a. Find the equilibria and their stability.

   b. How is this different from a case where there are S safe sites, and only $N_t - S$ hosts are available for attack?

   c. Modify the R program to simulate this case.

3. Suppose that instead of having a safe place to hide, hosts have a safe age. In particular, adults are vulnerable to attack, with a proportion e^{-aP_t} surviving long enough to make λ offspring. However, offspring are not attacked by parasitoids, and a fraction of σ survive to adulthood. Development takes exactly two years for hosts and one year for the parasitoids. Can this invulnerable age class stabilize the interaction?