Math 5110 - Fall 2012
Homework Problem Set 4
Due Oct. 4, 2012

1. 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 and are not subject to attack. Find the equilibria and their stability. Is this different from the case where there are a fixed number S of safe sites, and only $N_t - S$ hosts are subject to attack?

2. Suppose that the hosts in a host-parasitoid system have two age groups, adults, which are vulnerable to attack, and juveniles, which are not vulnerable to attack by the parasitoids. The proportion of adults that escape attack produce λ juveniles (and then die), and a fraction σ of the juveniles survive to adulthood. Find the nonzero fixed point and the Jacobian for that fixed point. Are there parameters so that the determinant of the Jacobian is less than one in magnitude? If so, is the fixed point stable for these parameter values?