

Homework 3

1. Hastings Problems 6.1, 6.3.

- a. 6.1) The concepts of stability of mathematical models can be useful in understanding communities in nature, but may fail to include larger perturbations, like natural disasters (fire, flood, etc). For this course and the current chapter we are discussing, this type of model can be useful when assuming there are only small sizes of perturbation. Because there is no guarantee that these communities will stay within the confines of these stability models, there could be instances where they are not very useful.
- b. 6.3) For a model of competition the signs would be negative because the two species are affecting each other both negatively. For a mutualist model the sign would be positive because both species benefit from the interaction. Lastly, a predator-prey model would have the predator species positive and the prey species negative. This is because of the effect of the predator eating the prey (positive for the predator, but negative for the prey).

2. In Hastings chapter 6, $a_{ij} = dF_i/dN_j$ and is used to compute the community matrix as for one species. In chapter 7, a_{ij} represents the interspecific and intraspecific density dependence. I think keeping the i and j subscripts would be beneficial because they represent species 1 and species 2, but changing the a to another symbol or letter would make it much less confusing (as long as the new symbol chosen is not already common in the series of equations used for either notations - such as not using N or n).

3. Increasing the p parameter changes the amount of people that move from New York to California. This in turn affects the value of the $1-p$ parameter (fraction of people in New York that stay). The larger the value of the p parameter, the smaller the value of the $1-p$ parameter. When p is maxed out at a value of 1, the $1-p$ parameter is 0. This means that the fraction of New Yorkers all move to California.
4. Wiki Pitch: Emerald Ash Borer

https://docs.google.com/document/d/1_O17qlcKORgBnMR9e0TWP22CQtPILDmgo5h56swLwF4/edit?usp=sharing