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BI471 HW3

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1. 6.1: Concepts of stability and mathematical models are useful in a variety of research and applied research fields such as conservation biology. When we take any observation in nature it is only a snapshot of highly dynamic processes and ecosystems. Mathematical models can help us understand how these dynamic systems will change and provide a broader understanding of dynamic populations. Stability analyses are key to predicting how a species will change in the future, and can help conservation biologists predict the effects of future disturbances on specific populations.

6.3: For predator prey models (the per capita growth rate for species 1) will be negative, while (the per capita growth rate for species 2) will be positive. For mutualism models, and will be positive, and for competition models and will both be negative.

2. In chapter 7, 𝞪ij represents the density dependence of species j on species i. In chapter 6, 𝞪ij represents the rate at which disturbed population N(hat) + n returns to a stable state at population N. In chapter 6 a better notation might be ij, simply to distinguish between the two variables.

3. The p parameter is the percent of New Yorkers that move to California annually. As p increases the slope of the eigenspace line decreases. Every point along this line is a place at which the populations of New York and California are in equilibrium. So when the slope decreases, it can be interpreted as the equilibrium state moving closer to California. That is, as the slope decreases the population that will be in California at a steady state increases.

4. Link to google doc: <https://docs.google.com/document/d/13hmRM7mHGZ6405wBPlfcvyTo3KDfS-FlbPJ7A0A90Cs/edit>