BIOL 3295 Fall 2019

Midterm due XXXX

1. May's logistic growth equation is,

$$N_{t+1} = \lambda N_t \left(1 - \frac{N_t}{K}\right). \tag{1}$$

In discrete time an equilibrium is defined as a value of N_t such that $N_t = N_{t+1}$. Verify that $N_t = \frac{\lambda-1}{\lambda}K$ is an equilibrium point for equation 1.

2. Assuming that $N_t > 0$, rearranging equation 1 gives,

$$\frac{N_{t+1}}{N_t} = \lambda - \lambda \frac{N_t}{K}, \tag{2}$$

where $\frac{N_{t+1}}{N_t} > 1$ indicates an increase, $\frac{N_{t+1}}{N_t} = 1$ indicates no change, and $\frac{N_{t+1}}{N_t} < 1$ indicates a decrease in population size from year t to year $t+1$. Sketch a graph with $\frac{N_{t+1}}{N_t}$ on the y-axis, and N_t on the x-axis. For your graph label:

- The intercept on the y-axis,
- The intercept on the x-axis,
- The slope of the line,
- $\frac{N_{t+1}}{N_t} = 1$
- The value of N_t where the lefthand side of equation 2 is equal to 1.

References

3. [Vandermeer and Goldberg, 2013] Vandermeer, J. H. and D. E. Goldberg, 2013. Population ecology: first principles. Princeton University Press. Available as an ebook from the MUN library. https://ebookcentral.proquest.com/lib/mun/detail.action?docID=1205619