Leslie Matrix Models

Goals: Interpret the model, convert between the graph and the projection matrix, and predicting future populations

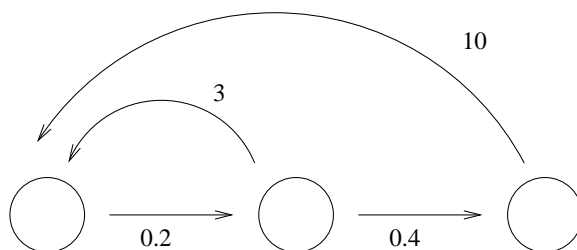1. Write the projection matrix for the model in figure 1.

Figure 1: Leslie Model for problems (1)-(3)

2. What percent of stage 1 survives to make it to stage 2? What percent survives from stage to stage 3?

3. What does the 10 on the arrow from stage 3 to stage 1 represent?

4. Initially, there the population is 100 in each stage. Find the populations of each stage after one time step.

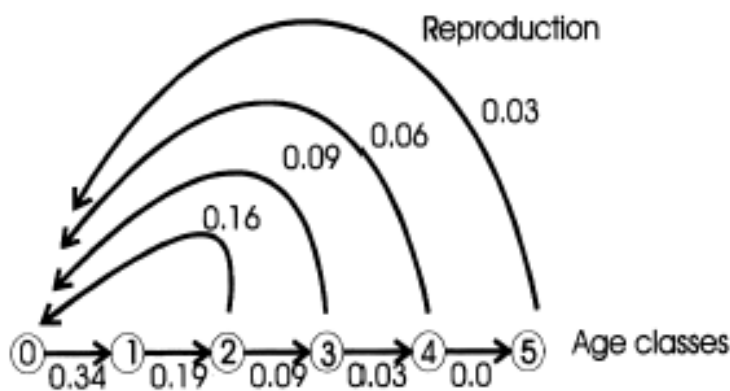5. Find the populations of each stage after two time steps.

Figure 2: Leslie Model for Gunnison's prairie dog

6. Figure 2 is the Leslie Model for Gunnison's prairie dog ([1]). Write the projection matrix for this model.

7. How many survive from age class 4 to age class 5? What does this tell you about the long run population of age class 5?

8. If the initial population has 2000 in age class 0, 1000 in age class 1, 750 in age class 2, 600 in age class 3, 500 in age class 4, and 200 in age class 5, what is the population of each age class after 1 time step? 2 time steps?

References

[1] Cully, Jack F. Jr., Growth and Life-History Changes in Gunnison's Prairie Dogs after a Plague Epizootic, *Journal of Mammalogy*, Vol. 78, No. 1. (Feb., 1997), pp. 146-157.