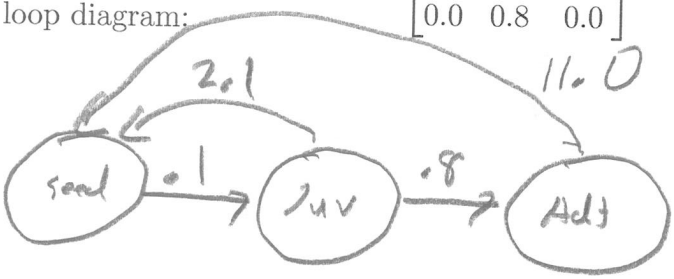
Mathematics 172

Quiz 34 Name: Key

You must show your work to get full credit.

The flower black-eyed-susan is biannual. So in the first year there are seedings, the second year juveniles, and in the third year adults. Assume that black-eyed-susans are growing in a meadow in Maryland (black-eyed-susans are the state flower of Maryland) and that the life history of these flowers in described by the Leslie matrix $L = \begin{bmatrix} 0.0 & 2.1 & 11.0 \\ 0.1 & 0.0 & 0.0 \\ 0.0 & 0.8 & 0.0 \end{bmatrix}$.

1. Draw the loop diagram:



2. What is the biological meaning of the number 2.1? Average number of offspring to a juvenile

3. What is the biological meaning of the number 0.8? Proportion of juveniles that survive to be adults.

4. Assume that in some year that there are 200 seedlings, 20 juveniles and 17 adults.

(a) How many seedlings, juveniles, and adults are there 40 years later? 41 later?

Number seedlings 40 yrs 716.072 Number seedlings 41 yrs 738.879

Number juveniles 40 yrs 69.547 Number juveniles 41 yrs 71.607

Number adults 40 yrs 53.894 Number adults 41 yrs 55.637

(b) What is the proportion in each class 40 years later? 41 later?

Proportion seedlings 40 yrs .852962 Proportion seedlings 41 yrs .853087

Proportion juveniles 40 yrs .082842 Proportion juveniles 41 yrs .082676

Proportion adults 40 yrs .064197 Proportion adults 41 yrs .06423

(c) Have we reached the stable age distribution? (Yes) or **No** (circle one). Explain.

The proportion in each age class is the same to 2 dec. places

5. What is the per capita growth rate? $r =$ .0317

$\vec{N}_{41} = \lambda \vec{N}_{40}$ so $\lambda = \frac{738.879}{716.072} = 1.0317$

$r = \lambda - 1 = .0317$