Mathematics 172

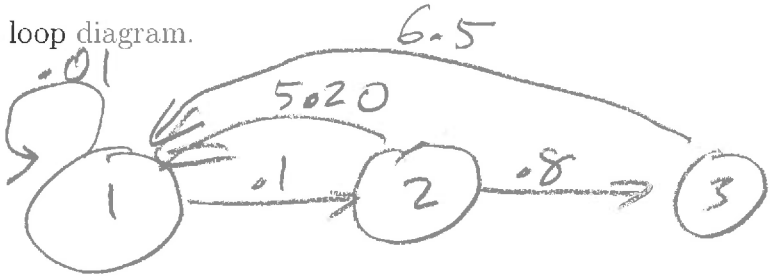
Quiz 37 Name: Key

You must show your work to get full credit.

A population of frogs in a small pond has three stages: tadpoles, juveniles, and adults. The Leslie matrix for this population is

$$L = \begin{bmatrix} .01 & 5.20 & 6.5 \\ .1 & 0 & 0 \\ 0 & .8 & 0 \end{bmatrix}$$

1. Draw the loop diagram.



2. Give the meaning of the following numbers

(a) 5.20 = average number of tadpoles produced by a juvenile.

(b) .8 = proportion of juveniles that live to be adults.

3. What is the proportion of tadpoles that live to be adults?

Proportion is $(.1)(.8) = .08$

4. This population got its start when the owner of the pond ordered 100 tadpoles off of eBay and released them in the pond.

(a) How many in each sage the next year:

tadpoles 1 juveniles 10 adults 0

(b) How many in each sage after ten years:

tadpoles 49.83 juveniles 4.55 adults 4.10

(c) What is the proportion in each stage after ten years:

tadpoles .852 juveniles .078 adults .070

5. We consult a computer that tells use that $\lambda = 1.02$ is an eigenvalue of L and that the corresponding eigenvectors is

$$\vec{V} = \begin{bmatrix} 1.04 \\ .102 \\ .08 \end{bmatrix}$$

(a) What is the per capita growth rate? $r = \lambda - 1 = .02$

(b) What is the stable age distribution?

tadpoles .851 juveniles .083 adults .065