

Mathematics 172

Quiz #13

Name: Key

You must show your work to get full credit.

For the Leslie matrix

$$L = \begin{bmatrix} 0 & 2.0 & 3.0 \\ .9 & 0 & 0 \\ 0 & .3 & 0 \end{bmatrix}$$

and initial condition

$$N_0 = \begin{bmatrix} 10 \\ 20 \\ 30 \end{bmatrix} \begin{array}{l} \leftarrow 1 \text{ year olds} \\ \leftarrow 2 \text{ year olds} \\ \leftarrow 3 \text{ year olds} \end{array}$$

answer the following:

1 pt (1) What is the initial number of one, two and three year olds?

Number of one year olds. 10

Number of two olds. 20

Number of three olds. 30

1 pt (2) What is the per capita birth rate of three year olds?

3.0

1 pt (3) What is the survival rate of two year olds?

.3

(4) What is N_1 ?

$$2 \text{ pts } N_1 = L N_0$$

$$= \begin{bmatrix} 0 & 2 & 3 \\ .9 & 0 & 0 \\ 0 & .3 & 0 \end{bmatrix} \begin{bmatrix} 10 \\ 20 \\ 30 \end{bmatrix}$$

$$N_1 = \begin{bmatrix} 130 \\ 9 \\ 6 \end{bmatrix}$$

$$= \begin{bmatrix} 0 + 2 \cdot 20 + 3 \cdot 30 \\ .9 \cdot 10 + 0 + 0 \\ 0 + .3 \cdot 20 + 0 \end{bmatrix} = \begin{bmatrix} 40 + 90 \\ 9 \\ 6 \end{bmatrix} \rightarrow$$