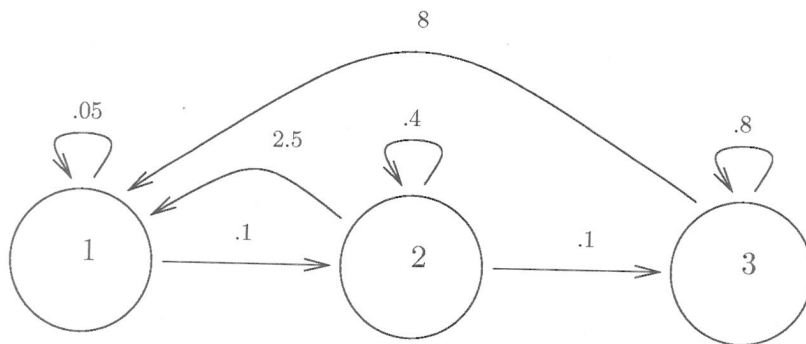**Quiz #20**

Name: _____ Key _____

You must show your work to get full credit.

A naturalist taking a census of native rhododendrons (a plant relates to azaleas) can distinguish between three stages of the plant.

(1) Seedlings,
(2) Juveniles,
(3) Mature plants.

The life history is summarized by the following loop diagram.

1. What is the average number of seedlings per year produced by a juvenile.

Average number is ___ 2.5 ___

2. What is the Leslie matrix?

$$L = [A] = \begin{bmatrix} .05 & 2.5 & 8 \\ .1 & .4 & 0 \\ 0 & .1 & .8 \end{bmatrix}$$

3. Starting with $\vec{n}(0) = \begin{bmatrix} 10 \\ 2 \\ 1 \end{bmatrix}$ compute $\vec{n}(30)$ and $\vec{n}(31)$ and use these to find the per capita growth rate r. (Recall that $\lambda = 1 + r$ and be sure to use at least 4 decimal places in your calculations.)

$$\vec{n}(30) = \begin{bmatrix} 25.79113 \\ 4.13451 \\ 1.84740 \end{bmatrix}$$

$$\vec{n}(31) = \begin{bmatrix} 26.40500 \\ 4.23292 \\ 1.89137 \end{bmatrix}$$

If $\lambda = 1 + r$ then
$\vec{n}(31) = \lambda \vec{n}(30)$

gives 3 equations for λ

$r = $ ___ .0238 ___

$\lambda = \dfrac{26.40500}{25.79113} = 1.0238$

$\lambda = \dfrac{4.23292}{4.13451} = 1.0238$

$\lambda = \dfrac{1.89137}{1.84740} = 1.0238$

These give the same value so $r = \lambda - 1$