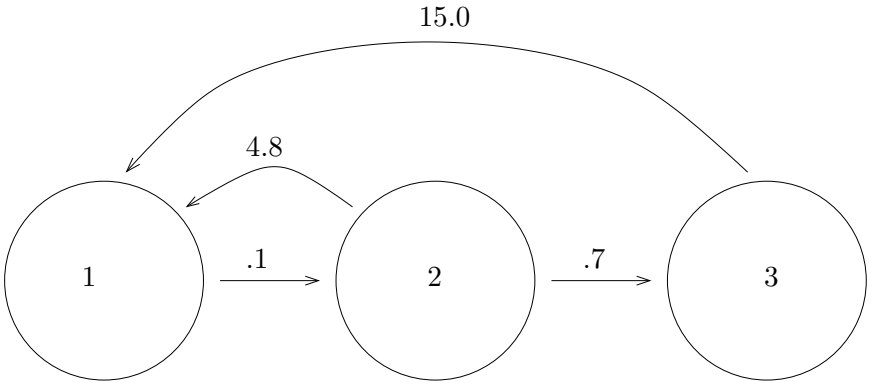
Mathematics 172 Homework, February 15, 2019.

1. A population of plants in weeds in a back yard has three stages. The first if seedling, the second is juvenile, and the third is adult. The life history of this population is summarized by the loop diagram.



(a) What does the number 4.8 mean?

(b) What does the number .7 mean?

(c) What is the Leslie matrix for this diagram?

(d) If we start with 15 seedling, 3 juveniles, and 2 adults then how many are in each stage the next year? The second year?

Solution: (a) That on the average each juvenile produces 4.8 offspring that live a year to be seedlings.

(b) That the proportion of juveniles that live to be adults is .7.

(c) The Leslie is

$$L = \begin{bmatrix} 0 & 4.8 & 15.0 \\ .1 & 0 & 0 \\ 0 & .7 & 0 \end{bmatrix}$$

(d) The next next year there will be 44.4 in stage 1, 1.5 in stage 2, and 2.1 in stage 3.

In the second year there will be 38.7 in stage 1, 4.44 in stage 2, and 1.05 in stage 3.

2. If the Leslie matrix is

$$L = \begin{bmatrix} 0 & 3.2 & 14.5 \\ .3 & 0 & 0 \\ 0 & .8 & 0 \end{bmatrix}$$

what is the loop diagram?

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Solution: