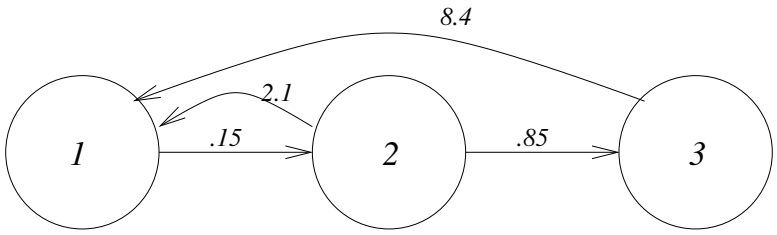
Mathematics 172 Homework

Several types of plant are biennial. That is they live for two years and produce seeds in the second year. Examples are onion, cabbage, parsley, silverbeet, Black-eyed Susan, and carrot. For some of this plant breeders and produced varieties that will produce some small number of seeds in their first year. In the following diagram we have three stages for a type of onion. The first stage is seedlings. The second is juvenile, that is plants that are one year old, and the third stage is adults, plants that are two years old. The plant do not live to a third year.

In this loop diagram the .15 is the proportion of seedlings that survive to be juveniles, the .85 is the proportion of juveniles that survive to be adults, the 2.1 is the average number of seedlings produced by a juvenile and the 8.4 is the average number of seedlings produced by an adult.



If in some year we find there are 98 seedlings, 15 juveniles, and 12 adults, then compute the following:

Number of seedlings in second year: _____

Number of juveniles in second year: _____

Number of adults in second year: _____

Number of seedlings in third year: _____

Number of juveniles in third year: _____

Number of adults in third year: _____

Number of seedlings in fourth year: _____

Number of juveniles in fourth year: _____

Number of adults in fourth year: _____

Solution:

In the second year

$$\text{Number of seedlings} = 15(2.1) + 12(8.4) = 132.3$$
$$\text{Number of juveniles} = 98(.15) = 14.7$$
$$\text{Number of adults} = 15(.15) = 2.25$$

In the third year

$$\text{Number of seedlings} = 137.97$$
$$\text{Number of juveniles} = 19.845$$
$$\text{Number of adults} = 12.495$$

In the foruth year

$$\text{Number of seedlings} = 146.6325$$
$$\text{Number of juveniles} = 20.6955$$
$$\text{Number of adults} = 16.86825$$