

The Euler-Lotka Formula. REVIEW AND SUMMARY.

"Definition"

from class:

$$\underline{I}_a = p_{a-1} p_{a-2} p_{a-3} \dots p_0$$

(Age- a survival fraction / probability)

"Rule 1"

from class implies:

$$n_a(t) = \underline{I}_a n_0(t-a) \quad (1)$$

"Rule 2"

from class:

$$n_0(t+1) = \sum_{a=0}^A f_a n_a(t) \quad (2)$$

Plug (1) into (2):

$$n_0(t+1) = \sum_{a=0}^A f_a \underline{I}_a n_0(t-a) \quad (3)$$

HYPOTHESIS: $n_0(t) = c \lambda^t$, Exponential growth.

Plug hypothesis into (3):

$$c \lambda^{t+1} = \sum_{a=0}^A f_a \underline{I}_a c \lambda^{t-a}$$

$$1 = \sum_{a=0}^A f_a \underline{I}_a \lambda^{-(a+1)}$$

Euler-Lotka Formula:

$$0 = \sum_{a=0}^A f_a \underline{I}_a \lambda^{-(a+1)} - 1$$

Solve for λ .