

Homework for Lecture 1 of Dr. Z.'s Dynamical Models in Biology class

Email the answers to

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by 8:00pm Monday, Sept. 8, 2025.

Subject: HW

with an attachment LastFirstHw1.pdf

1. Compute the first six terms of the sequence satisfying the recurrence equation

$$x_n = x_{n-1} + 2x_{n-2} - x_{n-3} \quad , \quad n \geq 3$$

subject to the initial conditions

$$x_0 = 1, x_1 = 2, x_2 = -1 \quad .$$

2. Solve explicitly the recurrence equation

$$x_n = 5x_{n-1} - 6x_{n-2} \quad ,$$

with initial conditions

$$x_0 = 0, x_1 = 1 \quad .$$

3. (Corrected Sept. 6, 2025, thanks to Caroline Hill [who won a dollar].)

In a certain species of animals, only one-year-old, two-year-old are fertile.

The probabilities of a one-year-old, two-year-old, female to give birth to a new female are p_1, p_2 , respectively.

Assuming that there were c_0 females born at $n = 0$, c_1 females born at $n = 1$ Set up a recurrence that will enable you to find the **expected** number of females born at time n .

In terms of c_0, c_1, p_1, p_2 , how many females were born at $n = 4$?