

BIO 480/680 Lab Exercise 11
Chaotic system model
Due date: 02 May 2025

This exercise is based on Robert May's simple population model as discussed in class:

$$N_{t+1} = a N_t (1 - N_t)$$

where N_t is the population size at time t , and a is a growth coefficient. This model represents a population with discrete, non-overlapping generations. Many temperate zone insects show these characteristics.

The goal of this project is to write a simple program that solves this model for several values of the growth constant a :

Try these four values for a : 1.5, 2.6, 3.3, 3.75

Your program should calculate the population size for at least 25 generations (seasons) and use a starting population size at time zero of 0.1.

Draw a graph showing the population size at each generation with a separate line for each value of a .

In your conclusions, think about how the behavior of the population changed dramatically as the growth constant changed. A couple of important questions might be:

1. How do you think the population course would change for a very slight change in the starting population size, say, 0.101 instead of 0.100?
2. Would such a change in the initial population size have a different effect on the outcome depending on the various values of a ?