

BIO 480/680 Lab Exercise 2

Logistic Population Growth Models

Due date: 14 February 2025

This exercise will involve modifying your program from the first exercise so that it will solve the logistic population growth model instead of the simple exponential growth model.

$$N_{t+1} = N_t + rN_t \left(1 - \frac{N_t}{K}\right)$$

Use the following two parameters for this population:

reproductive rate, $r = 0.25$ per year

carrying capacity, $K = 100$

Use your program to generate two sets of results; one for a population that starts out very small, well below the carrying capacity and one for a population that starts out above the carrying capacity:

Run 1: initial pop. size = 2.

Run 2: initial pop. size = 120.

Important: Make sure you develop your solution for a sufficient number of time steps so that you can see the full results. This will most likely mean further in time (more time steps) than for the first lab (exponential population model).

Present your results from the two runs in the form of one or two graphs. You may want to include in your program a way to save data to a disk file so that you can import the data into a spreadsheet or some other program for drawing graphs. See the sample program ExpSave.py for a few ways to save the data to a file. If you use Python to draw the graphs, you do not need to save the data to a file. See the sample program SimpleGraph.py for an example of drawing graphs with Python.

If you not going to use Python to draw the graphs, see the handout on the course web page or on WebCampus called “Graphing Tutorial” which covers graphing with Excel.

In your conclusions, discuss the effects on population size that resulted from adding the carrying capacity term to the previous exponential growth model (leading to this model).