Logistic Explorations!

Chaos and Fractals

College of the Atlantic

Do these before class on Friday, September 22, 2023

General Instructions

- Do this with others if you like. It might be more fun that way.
- We'll go over this in discussion section. There's nothing to hand in, but take some notes (words and/or pictures) as you explore.
- Don't spend more than 15-20 minutes on these exploration (unless you want to).
- Use this web page for iterating: https://dpfeldman.github.io/Chaos/time_series.html

You will investigate iterating the logistic equation, $f(x) = rx(1 - x)$, for different values of the initial condition x_0. For each of the r values listed below:

- Determine the long-term behavior of the itinerary. Does it approach a fixed point? Does it enter in to a cycle? If so, what is the period of the cycle?
- Try a few initial conditions for each r value. Your initial condition should be between 0 and 1. Don't choose simple fractions like 0.5 or 0.25.
- For each value, make a rough sketch of the time series plot.

Here are the r values to try:

1. $r = 0.5$.

2. $r = 1.5$.

3. $r = 2.9$

4. $r = 3.3$.

5. $r = 3.5$.

6. $r = 3.56$.

7. $r = 3.835$.

8. $r = 4.0$.