

Chapter 13: More with Chaotic Orbits

Worksheet to accompany

David Feldman, *Chaos and Fractals: An Elementary Introduction*,
Oxford University Press, 2012

In this exercise you will again use https://dpfeldman.github.io/Chaos/time_series.html to iterate the logistic equation: $f(x) = rx(1-x)$. We will consider the parameter value $r = 4$. Use the initial condition $x_0 = 0.222$

1. Do this exercise in groups of two.
2. Use the program to make 2000 iterates.
3. Start on the iterate that corresponds to the birthday of the oldest person in your group. For example, if that person's birthday was May 23, start with iterate 523¹.
4. Look at the four iterates starting with your birthdate. Convert those four iterates to 0s and 1s by “rounding.” If the iterate is less than 0.5, turn it into 0. And if the iterate is greater than or equal to 0.5, turn it into 1. For example, 0.44, 0.69, 0.8, 0.29 would be turned into 0, 1, 1, 0.
5. Write down this sequence of four 0s and 1s on a single post-it.
6. Repeat this exercise using the birthdays of the younger person in your group.
7. Repeat using the birthdays of your siblings, pets, etc. Do this until you have 5–7 post-its with numbers on them.
8. Place your post-its in the appropriate places on the board.

¹Or, if you're from outside the US, you could start with iterate 235. It doesn't really matter.