

Poincare Plots, Bifurcation Diagrams, and Cobweb Plots

Expanding Upon Chaos

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Poincare Plots

The Poincare plot is a recurring plot that allows one to analyze the similarity within the function when iterated repeatedly.

Cobweb Plots

Cobweb plots are another method of generating chaos from simple rules and very similar to the bifurcation we saw in last week's lab report, there is order up until a certain point, then chaos, then periods of order again.

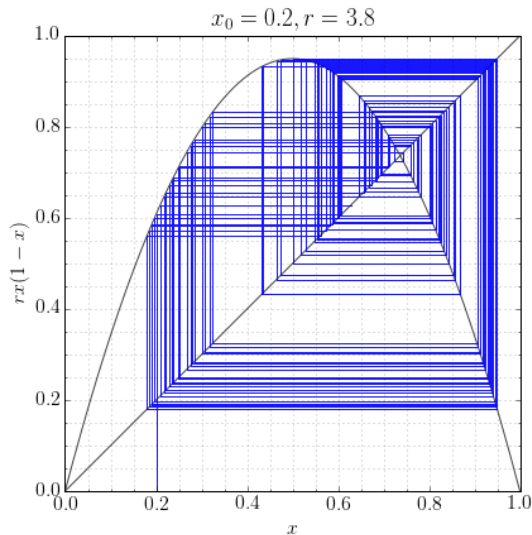
In order to plot a cobweb plot, a parabolic function is required. In this lab we used the following equation:

$$y = rx(1 - x) \quad (1)$$

- First you plot this equation.
- Next you plot the function $y=x$
- Then you pick any random point under the parabola and draw a line up to the parabola.
- Then draw a line from the current point on the parabola to the same y coordinate on the $y=x$ line.
- Then draw a line from the current point on the linear function to the same x coordinate on the parabola. Repeat.

Theory Continued

Eventually your plot will erupt into chaos, with periods of stability.



Conclusions

This lab expands upon the ideas of the previous labs and demonstrates the diversity of complex systems. Poincare and cobweb plots expands upon the idea that complex behaviors can arise from simple executions. This expands upon the idea that perhaps the seemingly random outcomes that emerge from complex systems may in fact be simple phenomena interacting repeatedly.

