Summary of Unit 5

Bifurcations: Part II
The Logistic Map

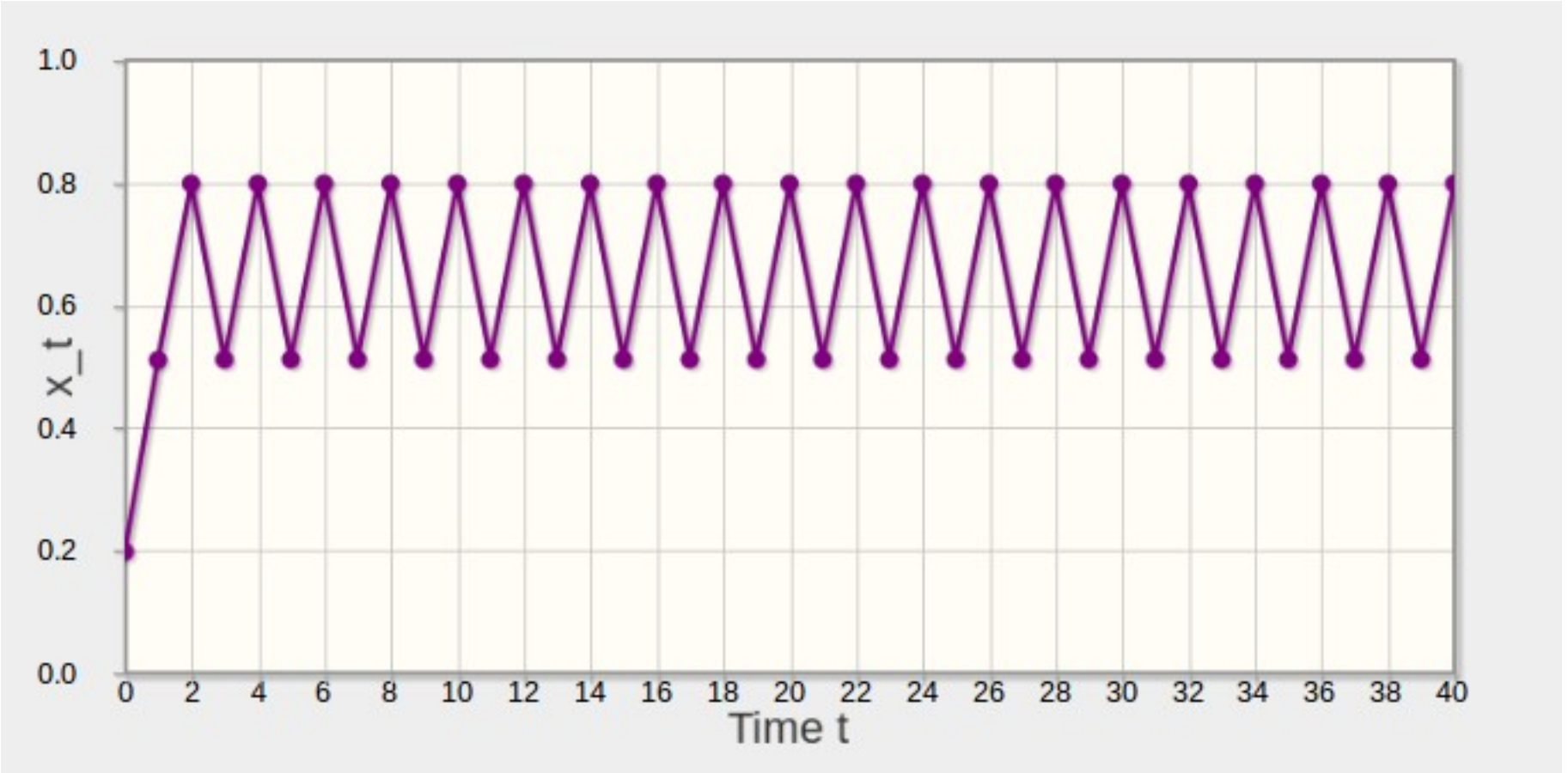
Introduction to
Dynamical Systems and Chaos

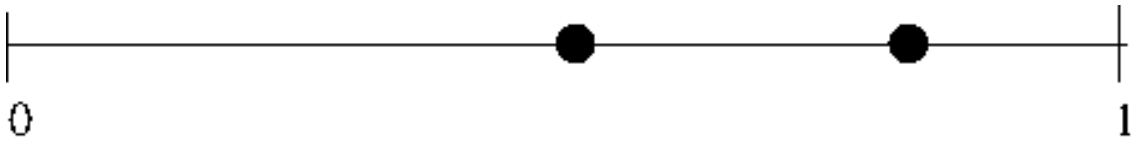
http://www.complexityexplorer.org

Final State Diagrams

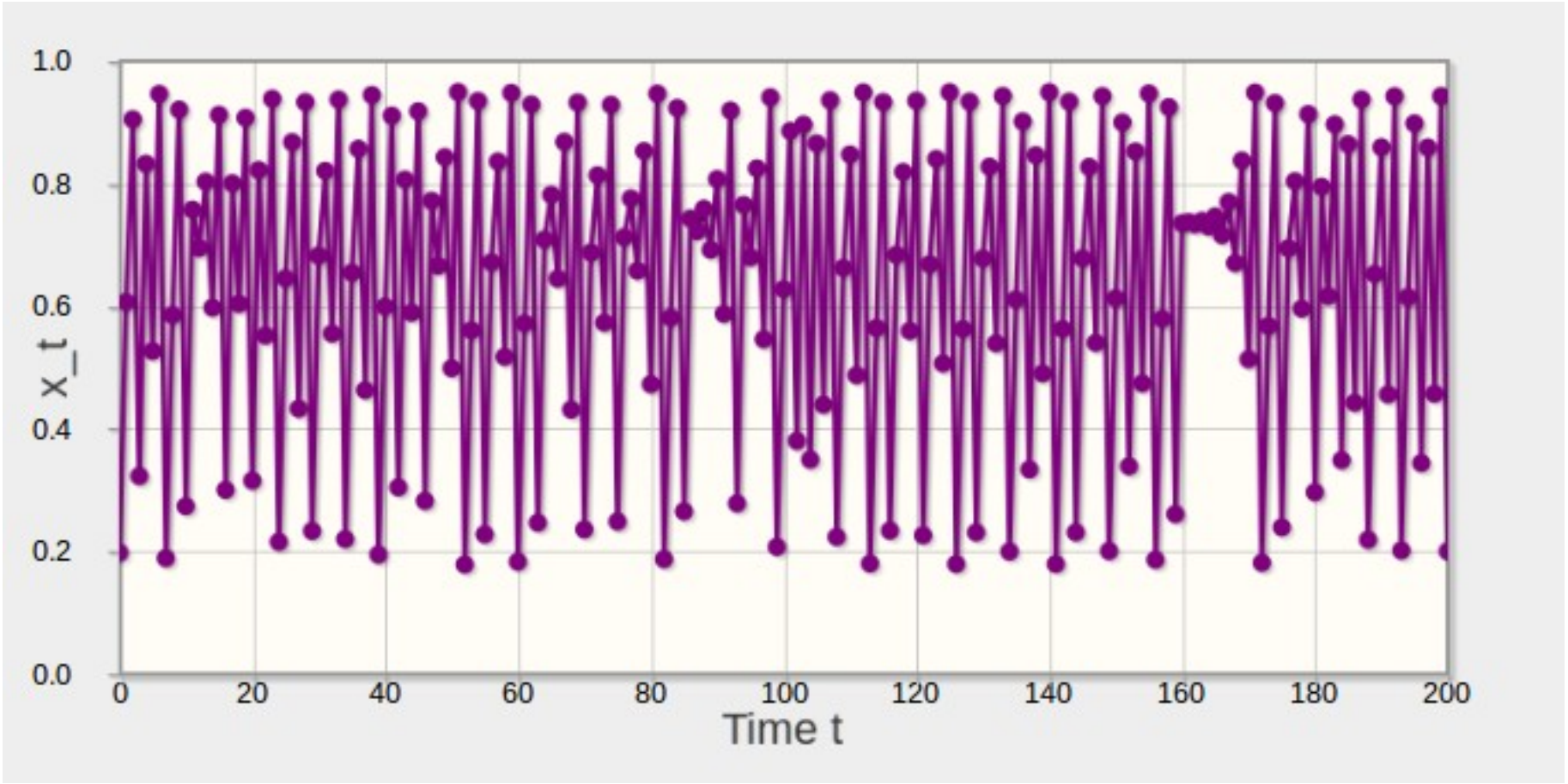
- For a given r value:
- Iterate 100 times
- Then plot the next 200 iterates on the unit interval
- The result is a final-state diagram, similar to the phase line for a differential equation

Final State Diagrams



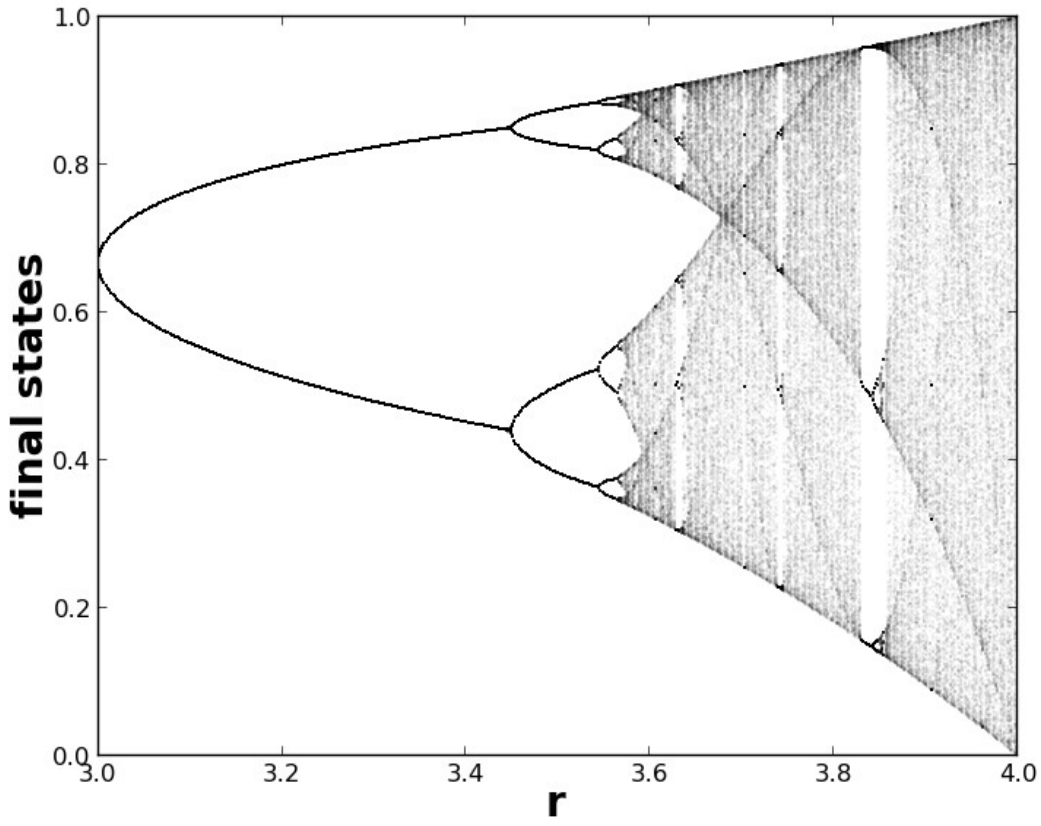


Final State Diagrams



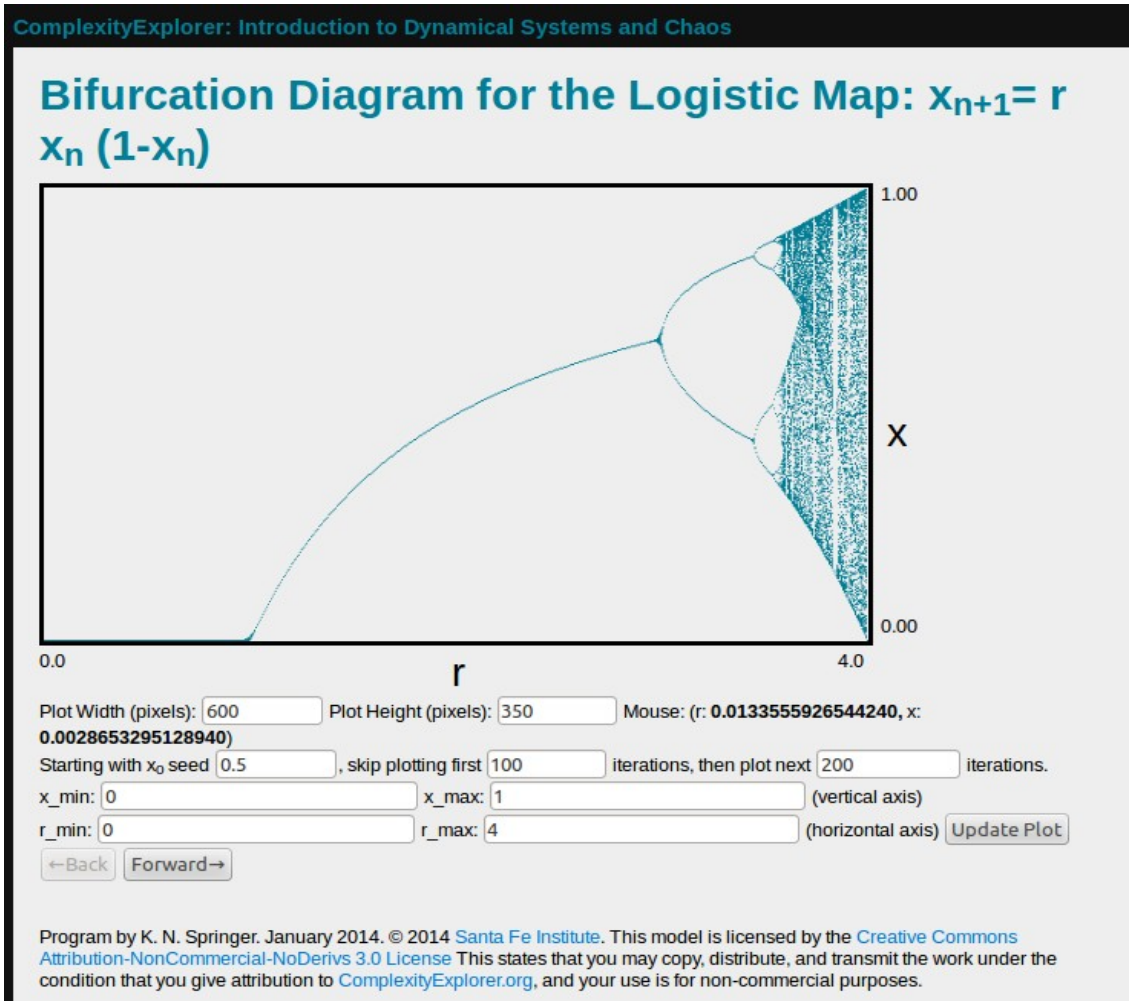
Bifurcation Diagram

- "Glue" lots of final-state diagrams together to make a bifurcation diagram.
- The bifurcation diagram is like a dictionary that lets you look up behaviors for different r values.



Bifurcation Diagram Program

- Can zoom in and explore
- Need to adjust number of orbits skipped and number of orbits plotted



Bifurcation Diagram

- The bifurcation diagram comes from the simple equation: $f(x) = rx(1-x)$
- The code to make a bifurcation diagram is very simple.
- The python program I used is just 47 lines.