Numerical Analysis and Programming

Lab Worksheet #3

The logistic map is defined as

$$x_{n+1} = ax_n(1 - x_n).$$

Use numpy and matplotlib to plot following figures:

- 1. Time series plots for $a=3.2,\,3.5$ and 4 for the first 100 iterations starting from x=0.1. (Fig. 1)
- 2. Cobweb plots for a = 3.2, 3.5 and 4 for 50 iterations starting from x = 0.1. (Fig. 2)
- 3. Bifurcation digram. To generate this plot you need to store last half of the x_i points in your time series. Fig. 3 is generated with $\Delta a = 0.001$, and 100 iterations for each a value.

Produce figures as close as possible to the given examples, including legends, labels, ticks, line width, annotation, etc.

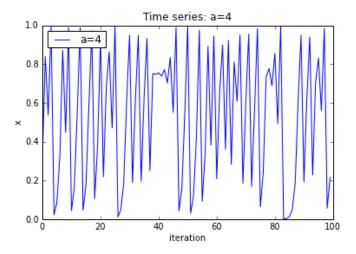


Figure 1: Time series plot for a=4.

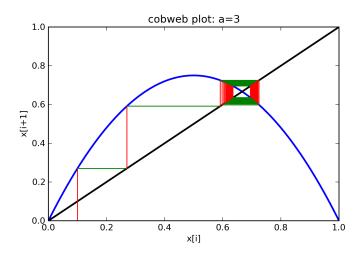


Figure 2: Cobweb Plot for a = 3.

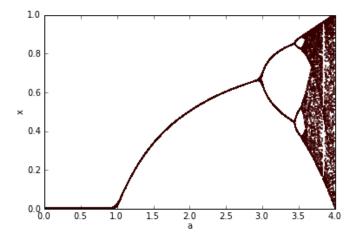


Figure 3: Bifurcation diagram