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.

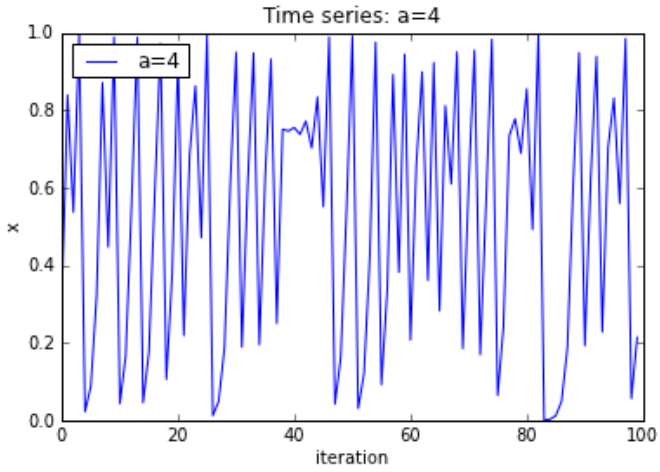

Figure 1: Time series plot for $a = 4$.

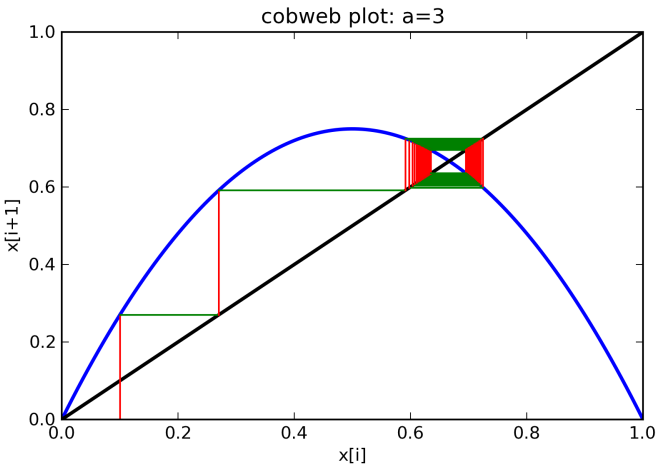

Figure 2: Cobweb Plot for $a = 3$.

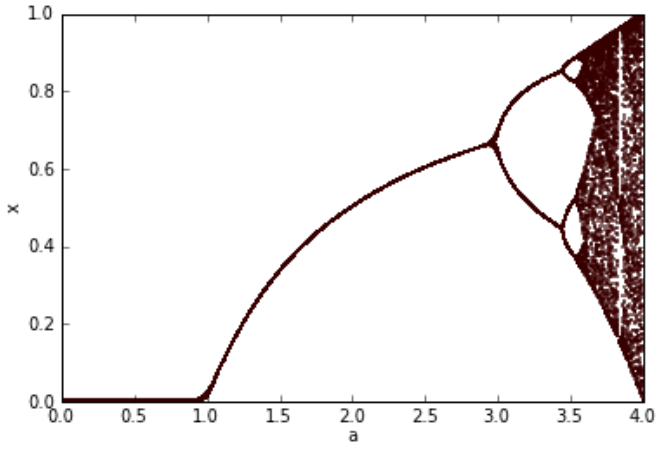

Figure 3: Bifurcation diagram