DYNAMICAL CHAOS

Due Date: 2/26/2014 @ 11:59 pm

The time propagation of a non-linear system typically depends quite strongly on the initial conditions, leading to an essentially unpredictable state of the system. This is known as dynamical chaos.

- Plot the bifurcation diagram for the logistic map and examine it carefully. Determine the bifurcation points accurately. Study the stability of attractor(s) for several values of the growth parameter r. Show by graphing that the bifurcation diagram is a fractal.

- Determine the cycle period of Arnold's cat map for the image you can find on the web page. Include several intermediate frames in your report. How does the period change if you scale the image down for a factor of 2?

- For the standard (Taylor-Greene-Chirikov) map plot the phase diagram and determine the critical value for the kick parameter K. Find fractal islands and determine the value of K at which they disappear. How many attractors does the standard map have?