

Math 388 Exercises

Instructions: due Tuesday. Use Mathematica for problems 4 and 5, and turn in only the portions of your work that are good.

1. For $a = 0$ and $b = 0.4$ in the Hénon map, graph the regions N , $f(N)$ and $f^2(N)$ for each fixed point $(0, 0)$ and $(-0.6, -0.6)$ and N a circle of radius 0.5. Speculate what the third iterates of N would look like.
2. Work problem 2.3 on page 98.
3. Work problem 2.4(a) on page 98.
4. For the bifurcation diagram in the previous hand-in assignment, magnify the portion that shows a 3-cycle attractor so that some of its period-doubling cascade is visible.
5. For the bifurcation diagram in the previous hand-in assignment, find and magnify a portion that shows a 5-cycle attractor.

Read the chapter "Inner Rhythms" and answer the following questions.

6. Does a mathematical model have to be physically accurate to be useful?
7. Briefly describe the Gaia hypothesis.
8. How have researchers used chaos theory to help understand fibrillation?