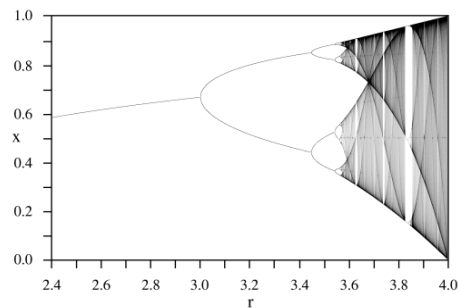


STATISTICAL PHYSICS & THERMODYNAMICS

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Warmup Exercise

EXERCISE 1.1: ATTRACTOR OF A QUADRATIC MAP (6P)

Let us consider the nonlinear map $x_{n+1} = f(x_n)$ with $f(x) = a - x^2$, where $a > 0$ is a constant.

- (a) Determine the real-valued fixed points $x^* = f(x^*)$ and assess their stability. (2P)
- (b) Set $a := 1$ and $x_0 := 0.5$ and iterate the map numerically up to $n = 20$. What happens for $n \rightarrow \infty$ and how do you interpret the result? (2P)
- (c) Prove your observation in (b) analytically. (2P)

($\Sigma = 6P$)

To be handed in on Monday, October 21, at the beginning of the lecture. This is a warmup exercise with only 6 of 12 points.