

Do problems 10.4.6, 10.4.7, 10.5.2, 10.6.3 from Strogatz.

Problem 5

Compute the invariant density $\rho(x)$ and the Lyapunov exponent λ for the following maps:

(a) The “warm up” map:

$$f(x) = \begin{cases} 2x, & 0 < x < 1/2 \\ 1 - x, & 1/2 < x < 1 \end{cases}$$

Hint: Since the map is piecewise linear, you may choose $\rho(x)$ to be piecewise constant.

(b) The tent map (for $0 < r < 2$):

$$f(x) = \begin{cases} rx, & 0 < x < 1/2 \\ r(1 - x), & 1/2 < x < 1 \end{cases}$$

Hint: Consider what the proper interval is on which the map should be defined for the purposes of computing $\rho(x)$.