Exercise 9.4 Escape rate of the tent map.

(a) *Calculate by numerical experimentation the log of the fraction of trajectories remaining trapped in the interval* $[0,1]$ *for the tent map*

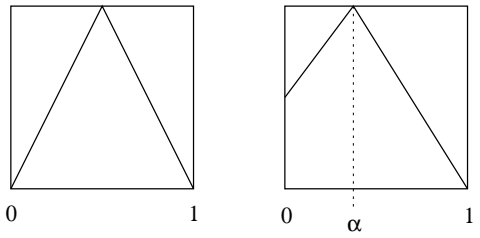
$$f(x) = a(1-2|x-0.5|)$$

for several values of a. [3]

(b) *Determine analytically the* a *dependence of the escape rate* $\gamma(a)$.

(c) *Compare your results for (a) and (b).*

Exercise 9.5 Invariant measure. *We will compute the invariant measure for two different piecewise linear maps.*



(a) *Verify the matrix* $\mathcal{L}$ *representation (10.19).*

(b) *The maximum value of the first map is 1. Compute an invariant measure for this map.*

(c) *Compute the leading eigenvalue of* $\mathcal{L}$ *for this map.*

(d) *For this map there is an infinite number of invariant measures, but only one of them will be found when one carries out a numerical simulation. Determine that measure, and explain why your choice is the natural measure for this map.*

(e) *In the second map the maximum occurs at* $\alpha = (3-\sqrt{5})/2$ *and the slopes are* $\pm(\sqrt{5}+1)/2$. *Find the natural measure for this map. Show that it is piecewise linear and that the ratio of its two values is* $(\sqrt{5}+1)/2$.

(medium difficulty)

Exercise 9.6 Escape rate for a flow conserving map. *Adjust* Λ_0, Λ_1 *in (10.17) so that the gap between the intervals* $\mathcal{M}_0$, $\mathcal{M}_1$ *vanishes. Show that the escape rate equals zero in this situation.*

Exercise 9.7 Eigenvalues of the Perron-Frobenius operator for the skew Ulam tent map. *Show that for the skew Ulam tent map*

[3] Mason: suggest specific values