$$X = \frac{1 - \cos\theta}{2}$$

Plug in

$$G(x) = 4x(1-x) = (2 - 2\cos\theta)\left(1 - \tfrac{1}{2} + \tfrac{1}{2}\cos\theta\right)$$

$$= (2 - 2\cos\theta)\left(\tfrac{1}{2} + \tfrac{1}{2}\cos\theta\right)$$

$$= (1 - \cos\theta)(1 + \cos\theta) = 1 - \cos^2\theta$$

$$= \frac{1 - \cos 2\theta}{2} \quad \text{via half angle formula.}$$

$$\cos^2\theta = \frac{1 + \cos 2\theta}{2}$$

So. by fixed pt iteration

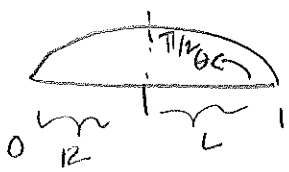
$y_{n+1} = G(x_n) \rightarrow \cos(\theta_{n+1}) = \cos(2\theta_n)$ ← only way true statement

$\Rightarrow \theta_{n+1} = 2\theta_n$

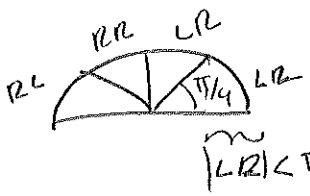
So iterating doubles angle!

What Do itineraries look like in terms of θ?

$k=0$

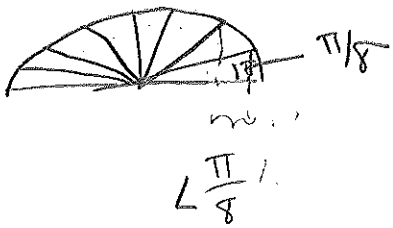


$k=1$



$|LR| < \pi/4$

$k=2$.



$\angle \frac{\pi}{8}$!

So the length of a solo interval $< \pi/2^k$ on level k.