

$$X_{n+1} = R \cdot X_n (1 - X_n)$$

$X$  state

$n$  time

$R$  parameter



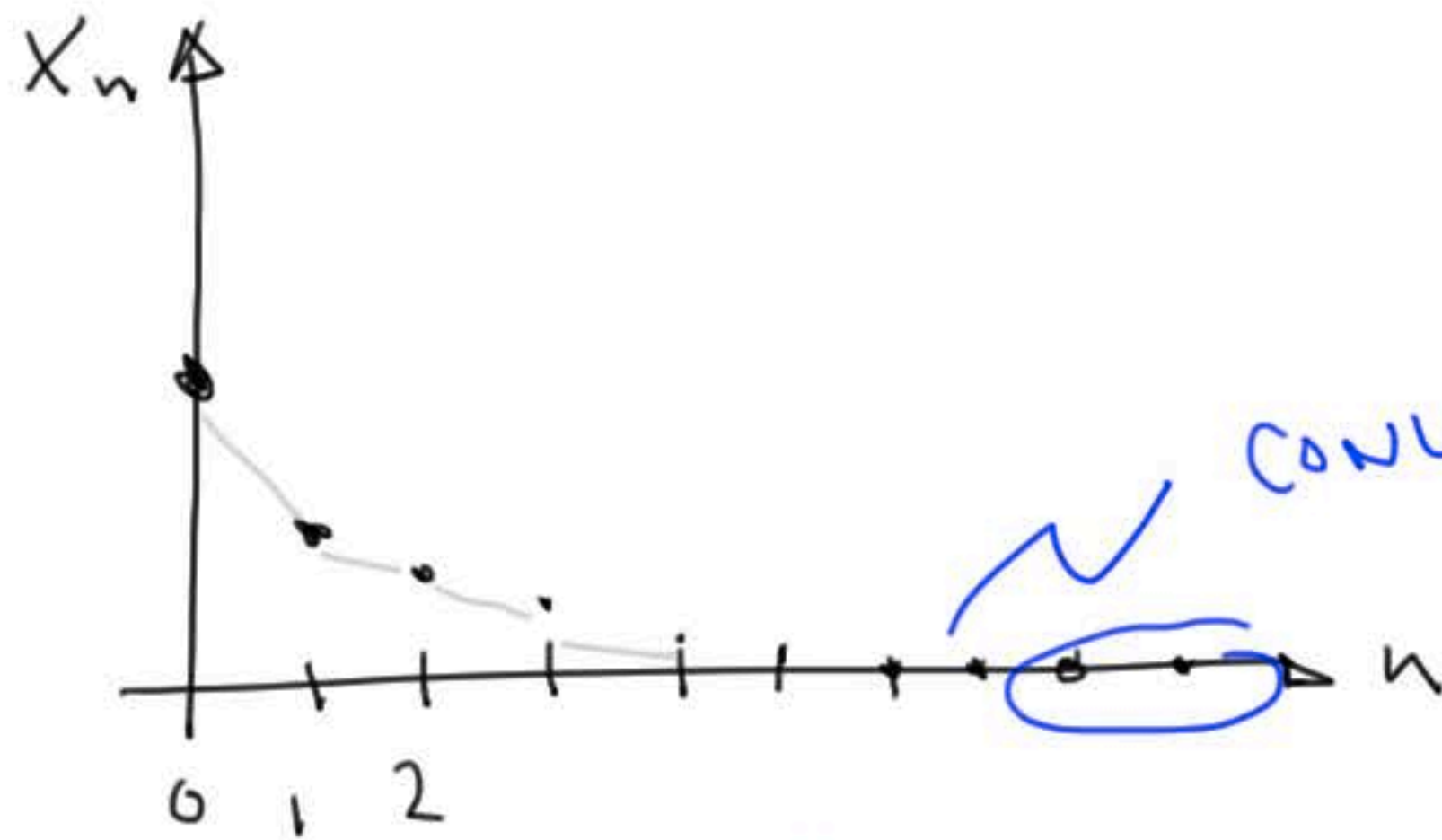
$$X_{n+1} = aX_n + b$$

$$R = 1.0$$

$$X_0 = 0.5$$

$$X_1 = (1.0)(0.5)(1 - 0.5) = .25$$

$$X_2 = (1.0)(0.25)(1 - 0.25) \\ = .1875$$



TRANSIENT

FIXED POINT

# Fixed Point FP

4

$$x^* = f(x^* + \Delta)$$

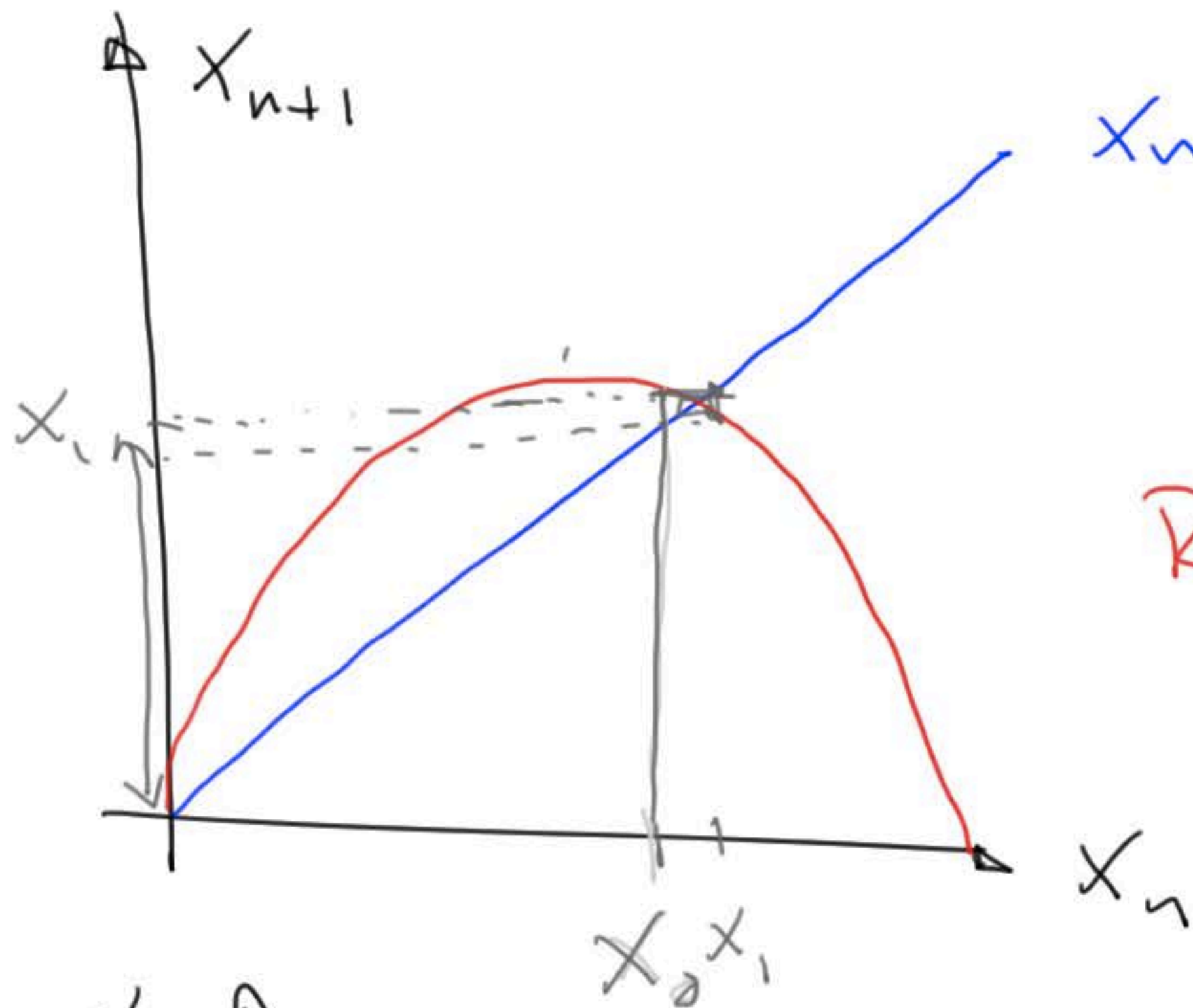
STABLE

ATTRACTING

UNSTABLE

REPELLING





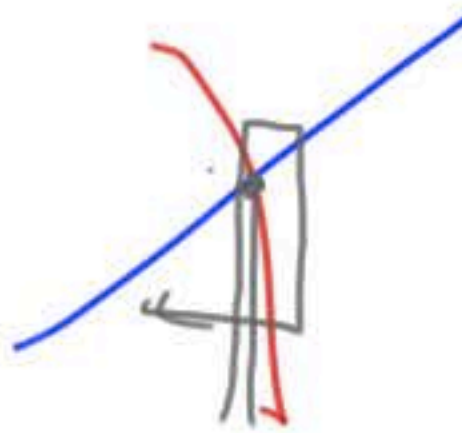
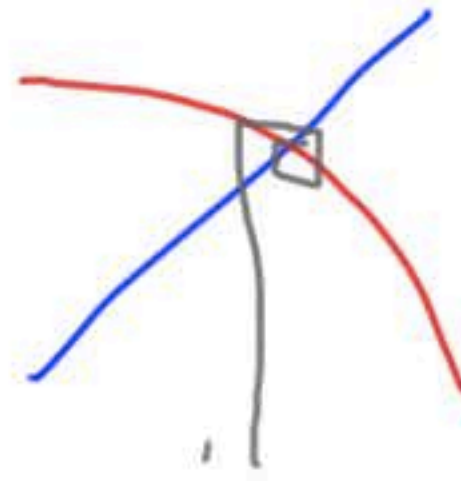
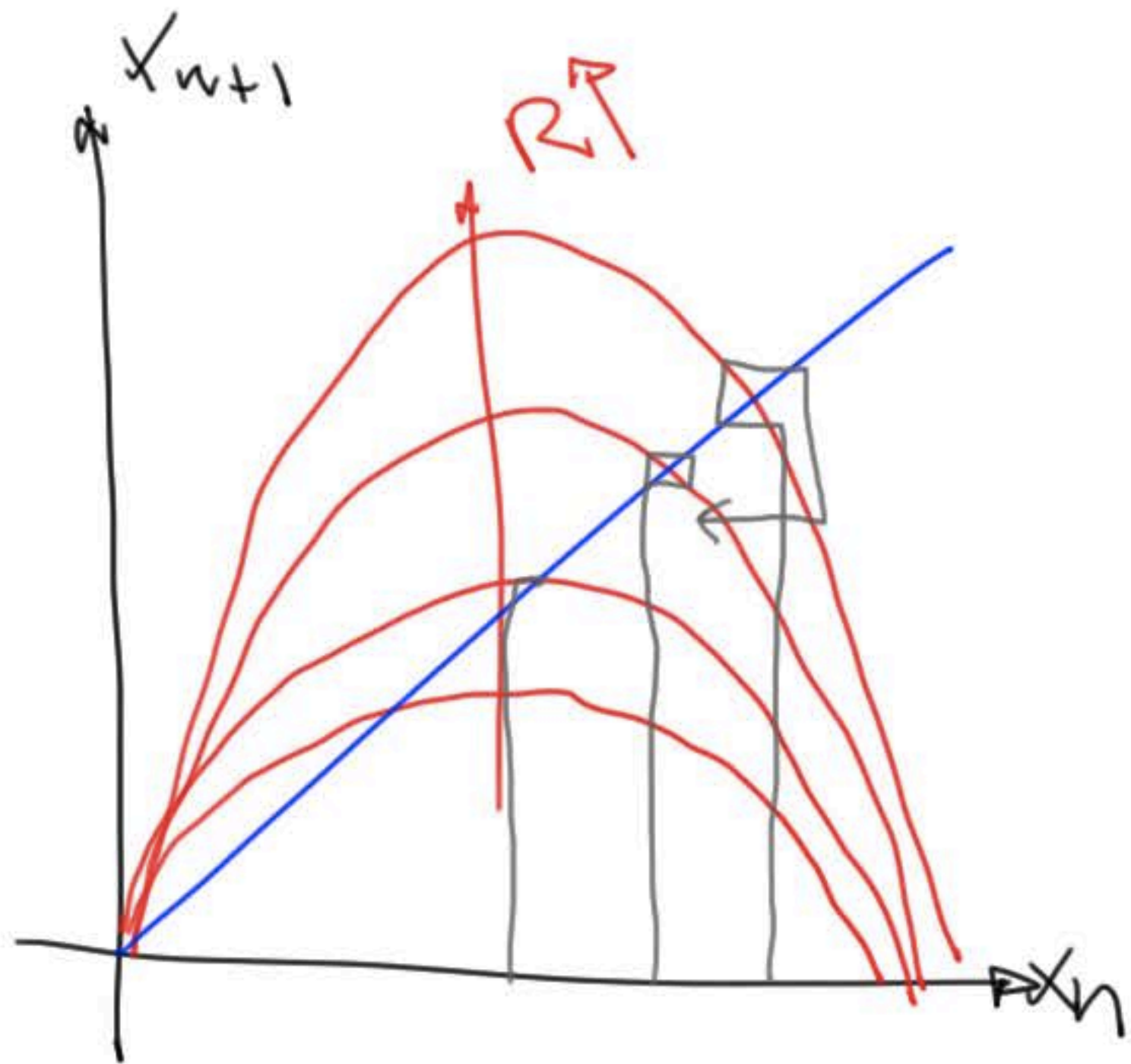
$$X_{n+1} = X_n$$

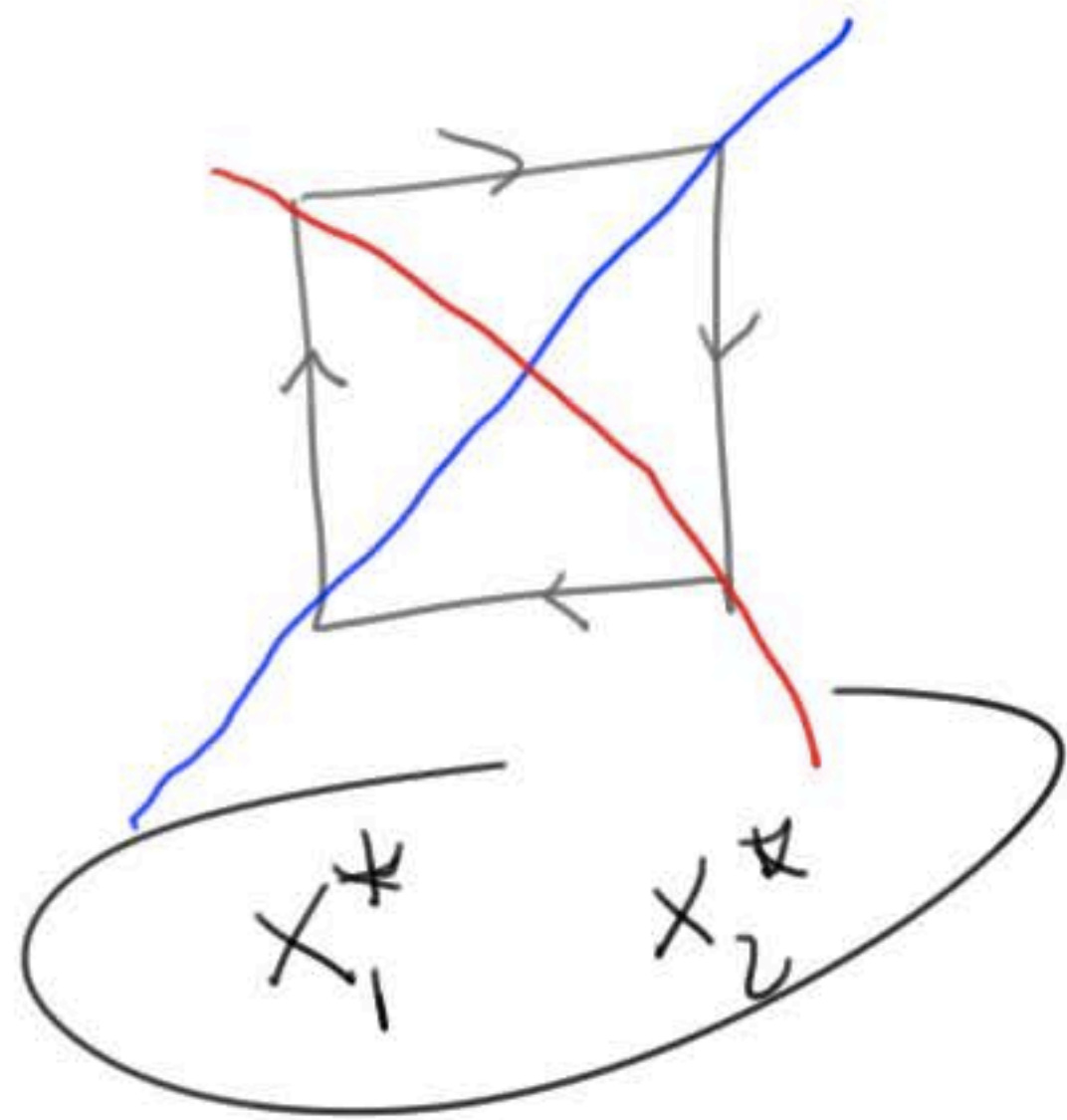


$$R \cdot X_n (1 - X_n)$$





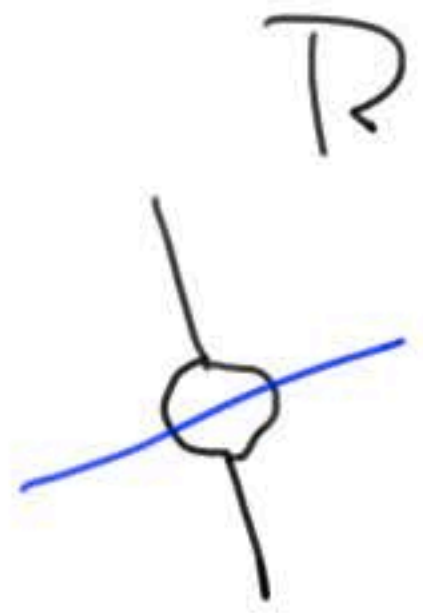




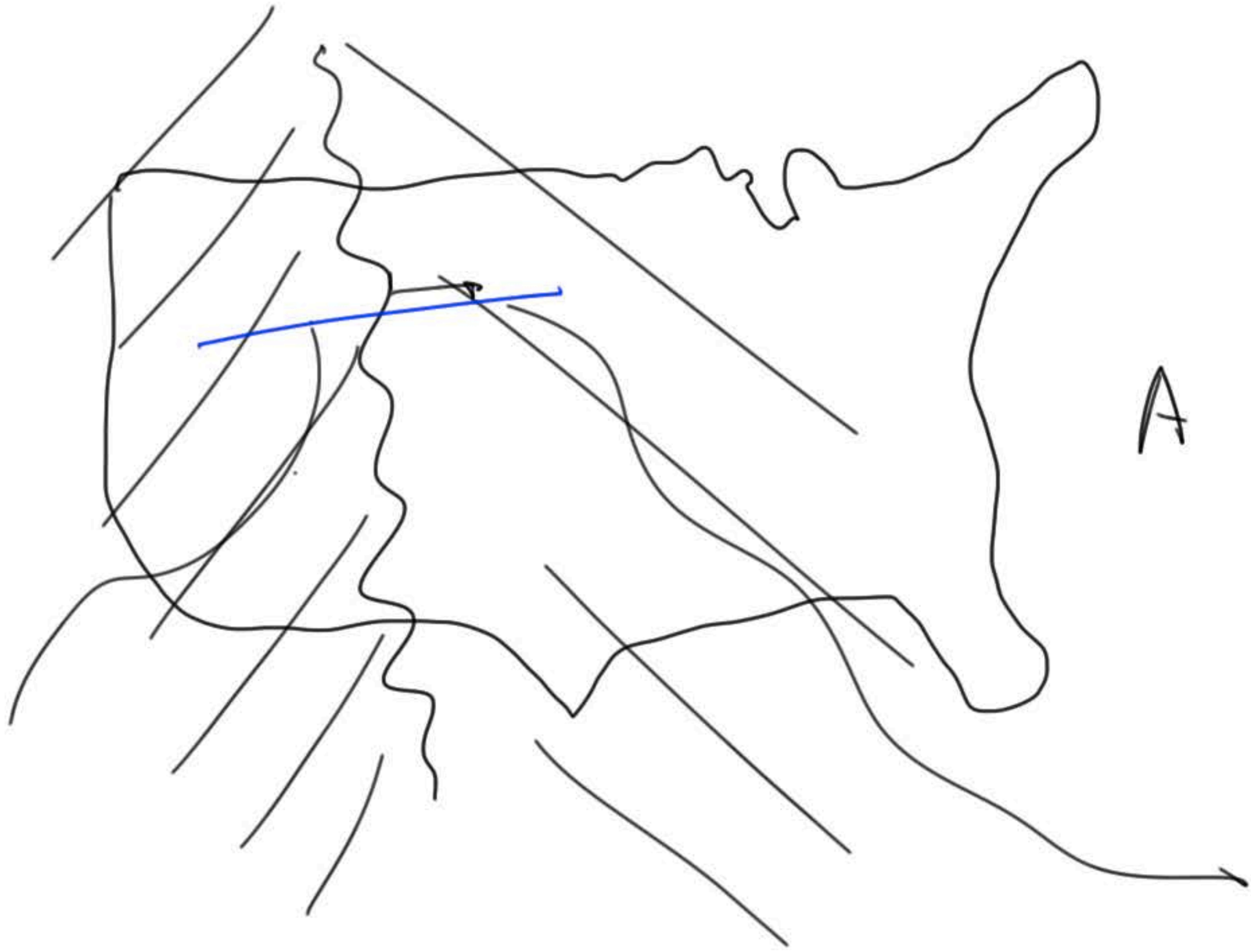
$$f(f(x_1^*)) = x_1^*$$

$$f(f(x_2^*)) = x_2^*$$

ATTRACTOR



R



A

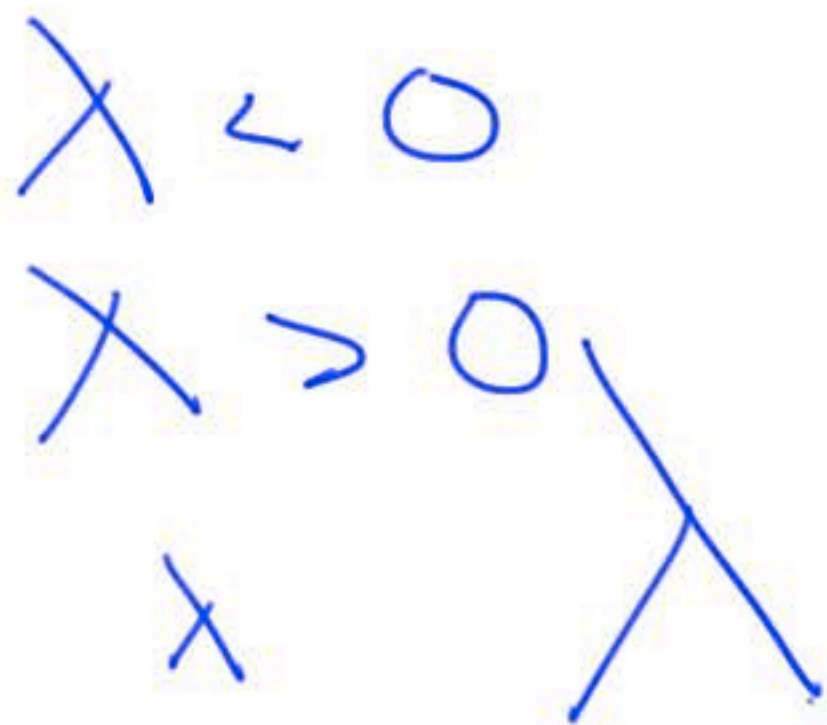


SDOLC

$$X_0 = 0.5$$

$$X_0' = 0.500001$$

$$|X_n - X_n'| \propto e^{-\lambda n}$$



Λ ΥΠΟΛΟΓΙΣΜΟΥ  
exponent



