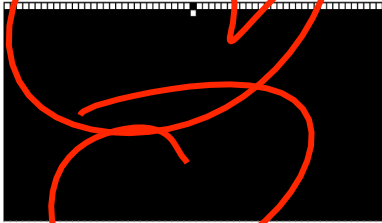


Model Thinking

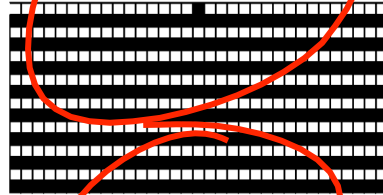
Scott E Page

Lyapunov Functions

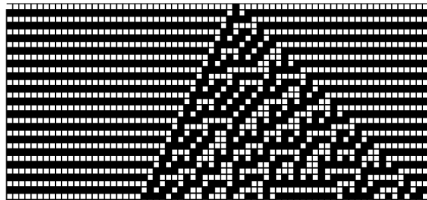
Class I: Rule 251



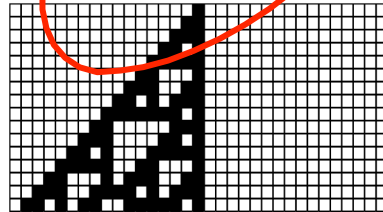
Class II: Rule 119



Class III: Rule 45

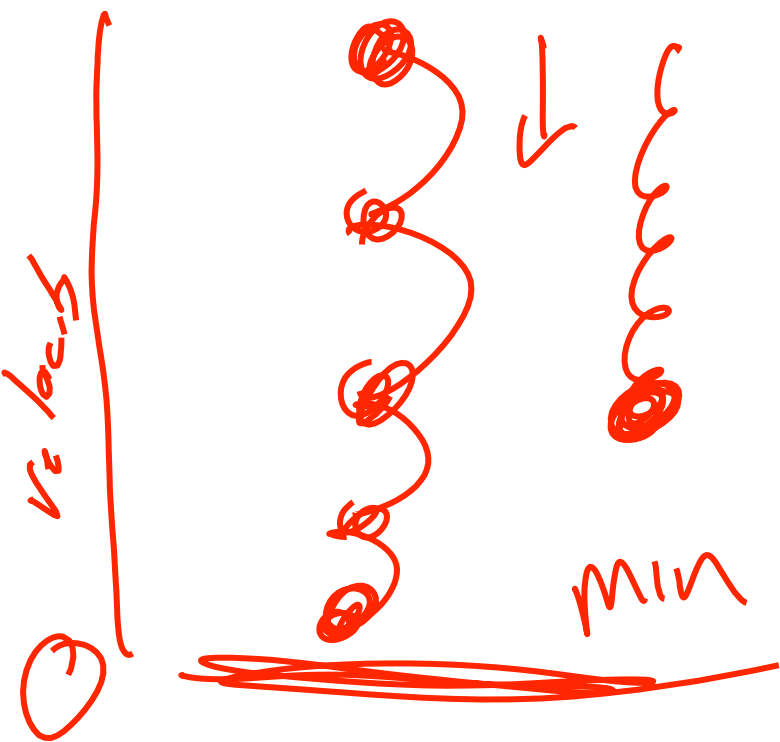


Class IV: Rule 110

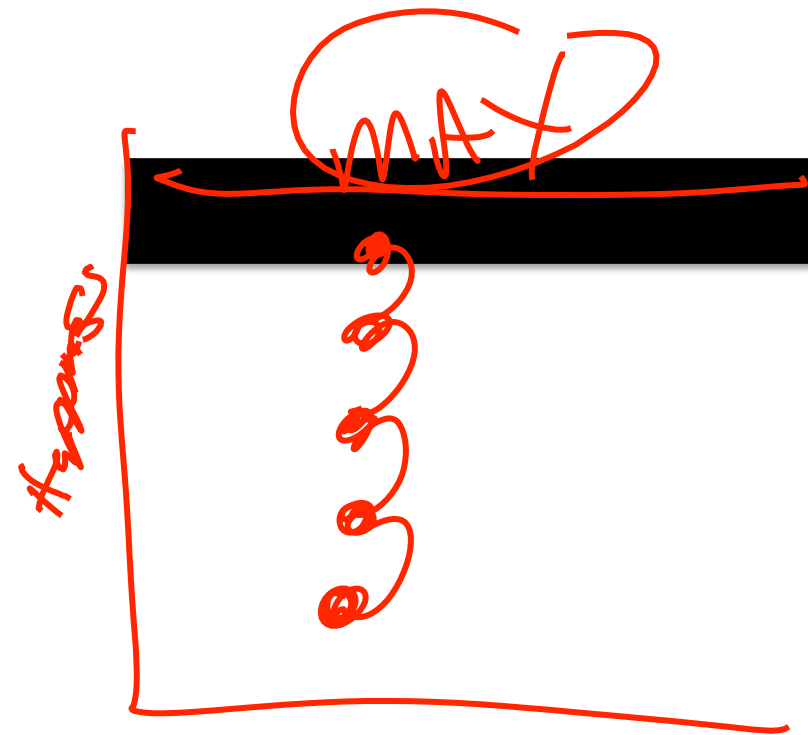


Source: From Wolfram (2002, pp. 55-56)

Wolfram.com



Physics



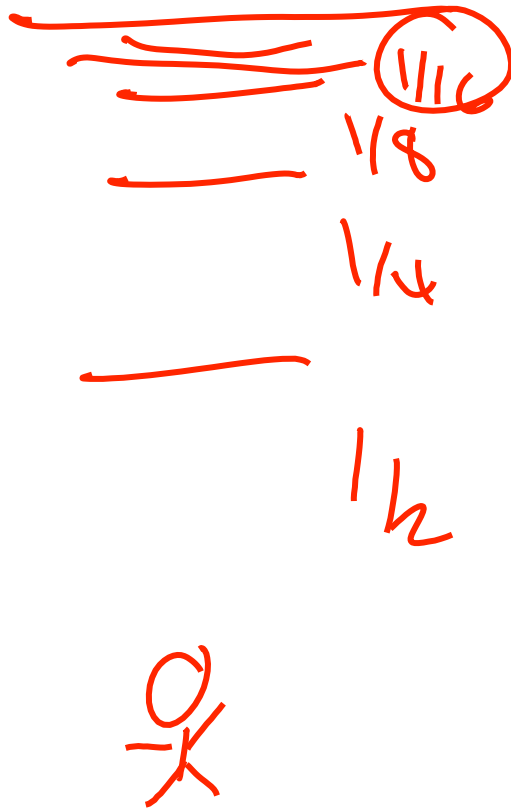
Economics

$F(x)$, a **Lyapunov**
function

A1: has a maximum
value.

A2: There is a $k > 0$ such
that if $x_{t+1} \neq x_t$, $F(x_{t+1}) >$
 $F(x_t) + k$

Claim: At some point x_{t+1}
 $= x_t$



Zeno's Paradox

$F(x)$, a **Lyapunov**
function

A1: has a maximum
value.

A2: There is a $k > 0$ such
that if $x_{t+1} \neq x_t$, $F(x_{t+1}) >$
 $F(x_t) + k$

Claim: At some point x_{t+1}
 $= x_t$



Bonus: How Fast

The Hard Part:
Constructing the
Lyapunov function.

Model Thinking

Scott E Page