Cellular Automata (CA)
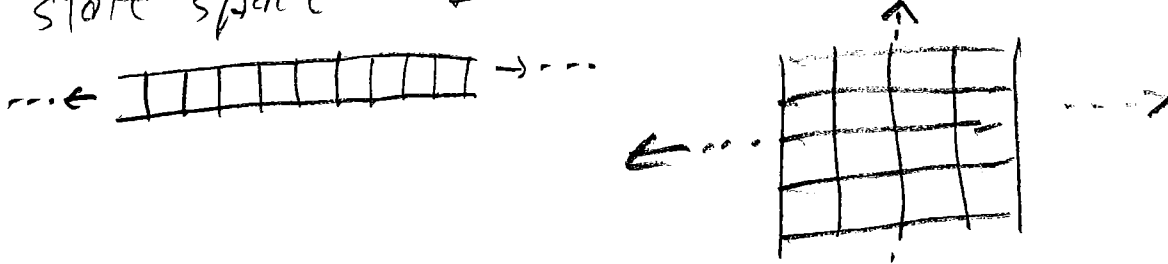
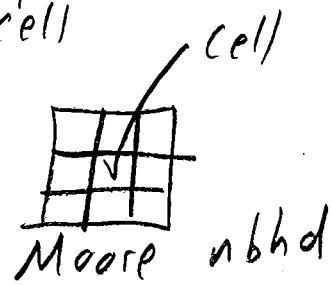state space : 1- or 2-dimensional collection of cells

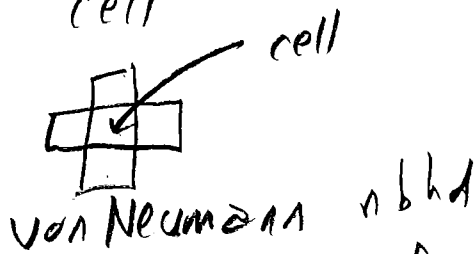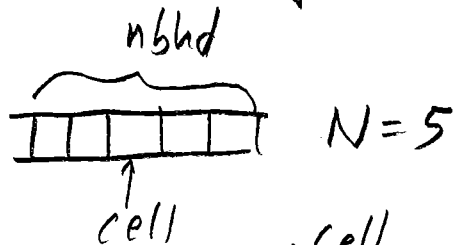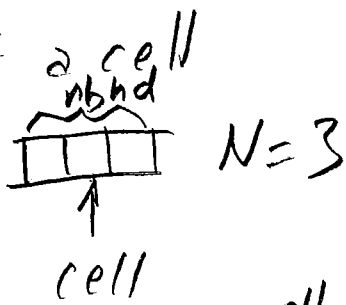computational examples
use wrap-around

number of states per cell: binary

$\blacksquare$ = alive
$\square$ = dead

nbhd of a cell

$N=3$

nbhd

$N=5$

cell
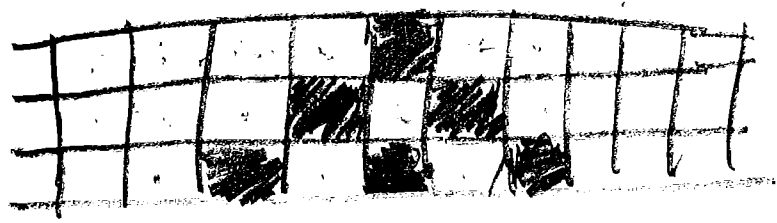
cell

von Neumann nbhd

cell

Moore nbhd

rule: which nbhd configurations give a live
cell in the next gen, which give
dead cells

$N=3$ rule: the middle cell becomes alive
for any of these nbhd configurations

gen 1
gen 2
gen 3

↓

outer totalistic rules : specify whether the central is alive or dead, and the number, but not the positions, of the live cells surrounding the central cell.

Conway's game of Life:
Moore CA outer totalistic rules:
central alive and 2 or 3 live nbhrs ⟶ central stays alive
central dead and 3 live nbhrs ⟶ central becomes alive
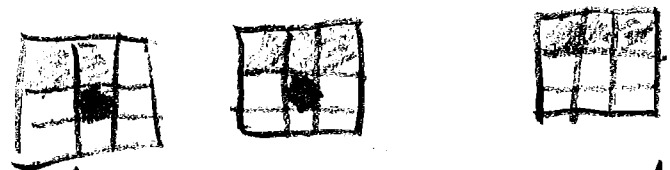
live central cell and any 2 of the surrounding 8 are alive

dead central cell and any 3 of the surrounding 8 are alive.