

Game of life

life happens on an infinite piece of square paper

A cell is one of the little squares

Each day, a cell is either alive or dead

dead

alive

Each cell interacts with its 8 neighbours

x	x	x
x	o	x
x	x	x

x = neighbours of o

Rules Each day :

of live
neighbours

2 or 3
alive
tomorrow

cells that are alive

not 2 or 3
dead
tomorrow

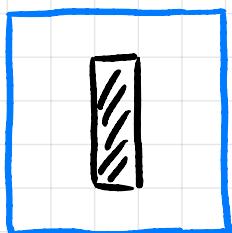
of live
neighbours

3
alive
tomorrow

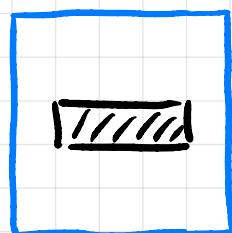
cells that are dead

not 3
dead
tomorrow

Example



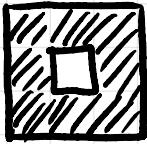
→



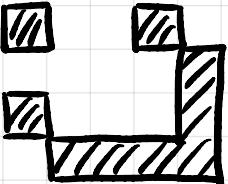
(Blinker)

Good examples to try out:

Blunker



Spaceship

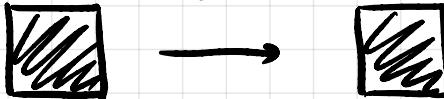


Can you find ...

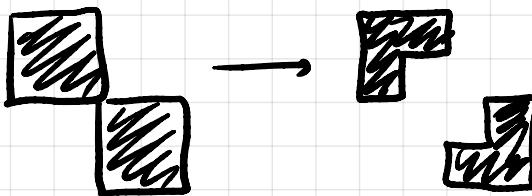
- A still life? = pattern that never changes
- A pattern with period 2? = repeats every other day
- A pattern with a higher period?
- A pattern that is NOT periodic? (meaning, it never repeats itself?)
- A pattern that changes for a few days and then becomes a still life?

Examples :

- A still life = pattern that never changes

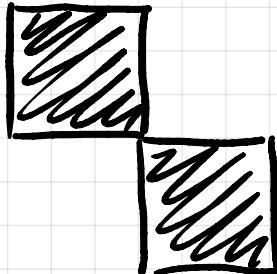


- A pattern with period 2



- A pattern with a higher period?

Figure 8



period 8
found by Simon Norton 1970

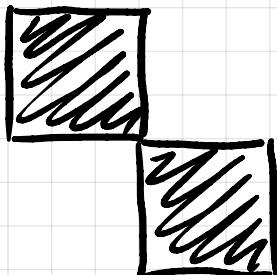
pentacathodon



has period 15
(found by Conway 1970)

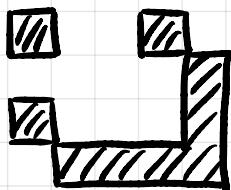
Fun fact In 1991, David Buckingham found an oscillator of period 856

What is the period of



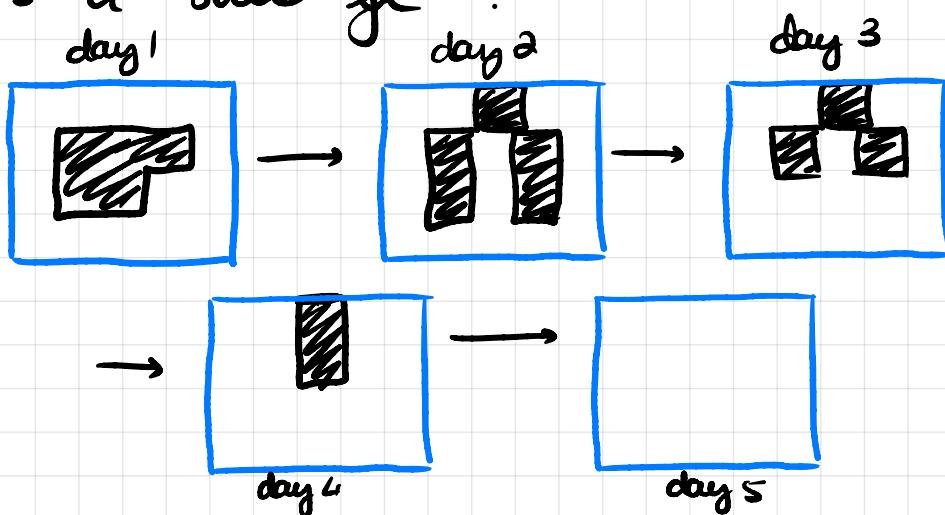
- A pattern that NEVER repeats?

Spaceship!

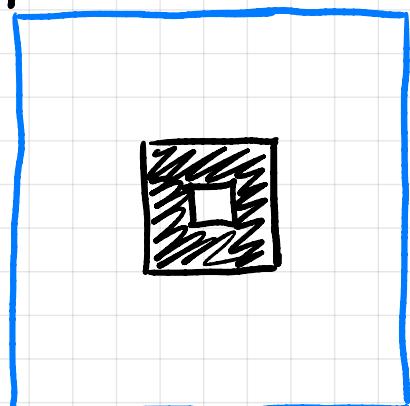


it moves!

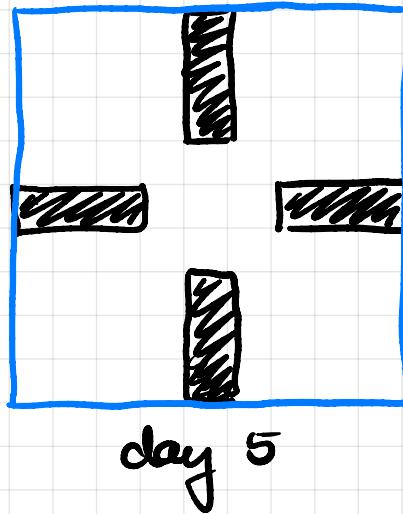
- A pattern that changes for a few days and then becomes a still life?



- A pattern that changes for a few days and then becomes periodic?



becomes



Extra questions:

- What patterns grow fastest?
using few live cells to start
maximize the number of live cells
after 5 days / 10 days
- What patterns travel fastest?
maximize the distance from
right most live cell after 5 / 10 days
vs start
- What patterns live longest
before dying out?
- Can you tell if a pattern
lives forever or dies out?