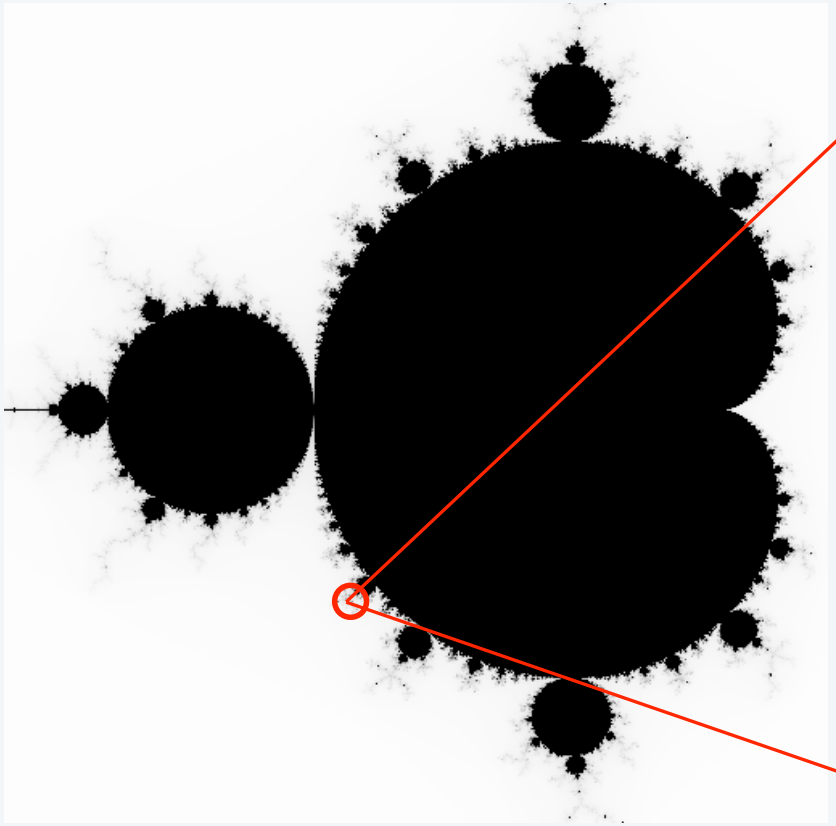
# COS 126 Movies

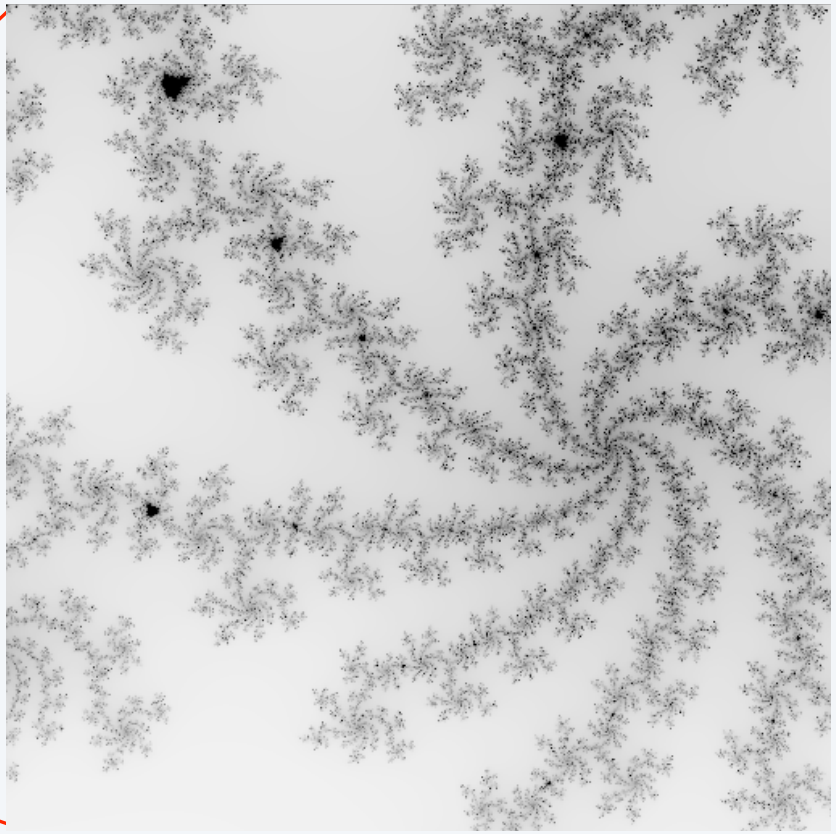
- Mandelbrot
- Insertion sort
- Game of Life
- Animusic
- Momentum

# Mandelbrot Set

```
% java GrayscaleMandelbrot -.5 0 2
```



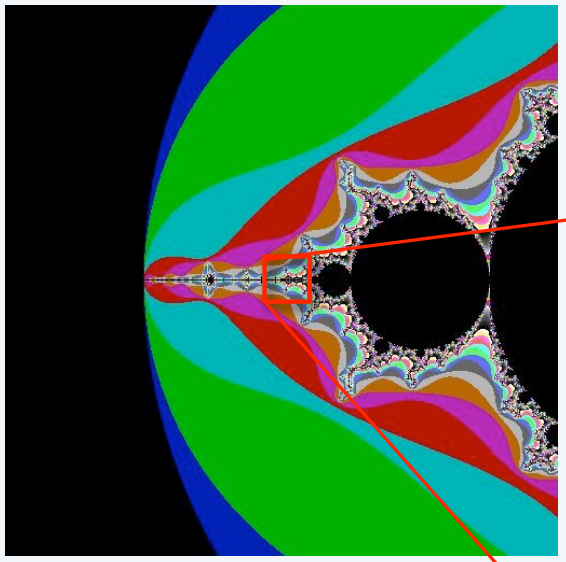
```
% java GrayscaleMandelbrot .1045 -.637 .01
```



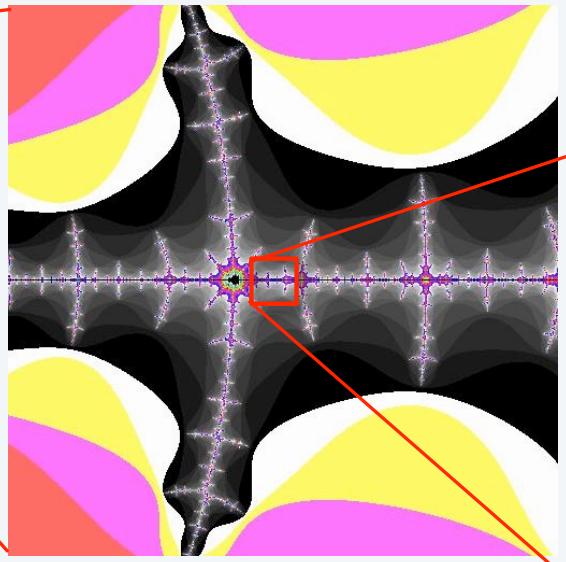
# Mandelbrot Set

```
% java ColorMandelbrot -.5 0 2 < mandel.txt
```

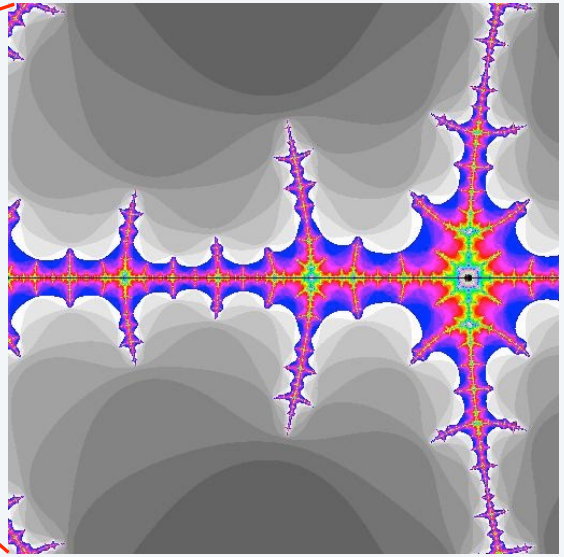
color map



-1.5 0 2

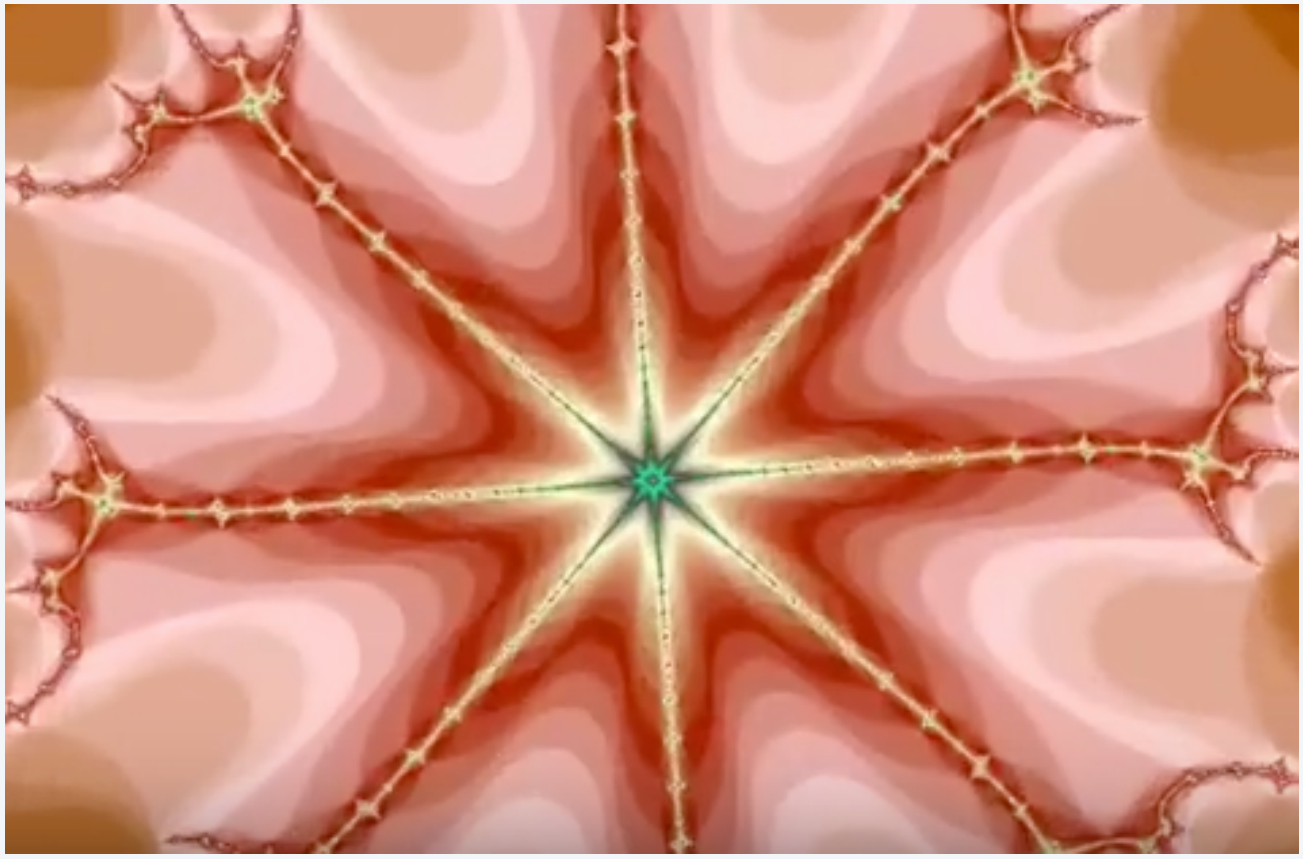


-1.5 0 .002



# Deepest Mandelbrot Set Zoom Animation Ever

https://www.youtube.com/watch?v=0jGaio87u3A 5:11

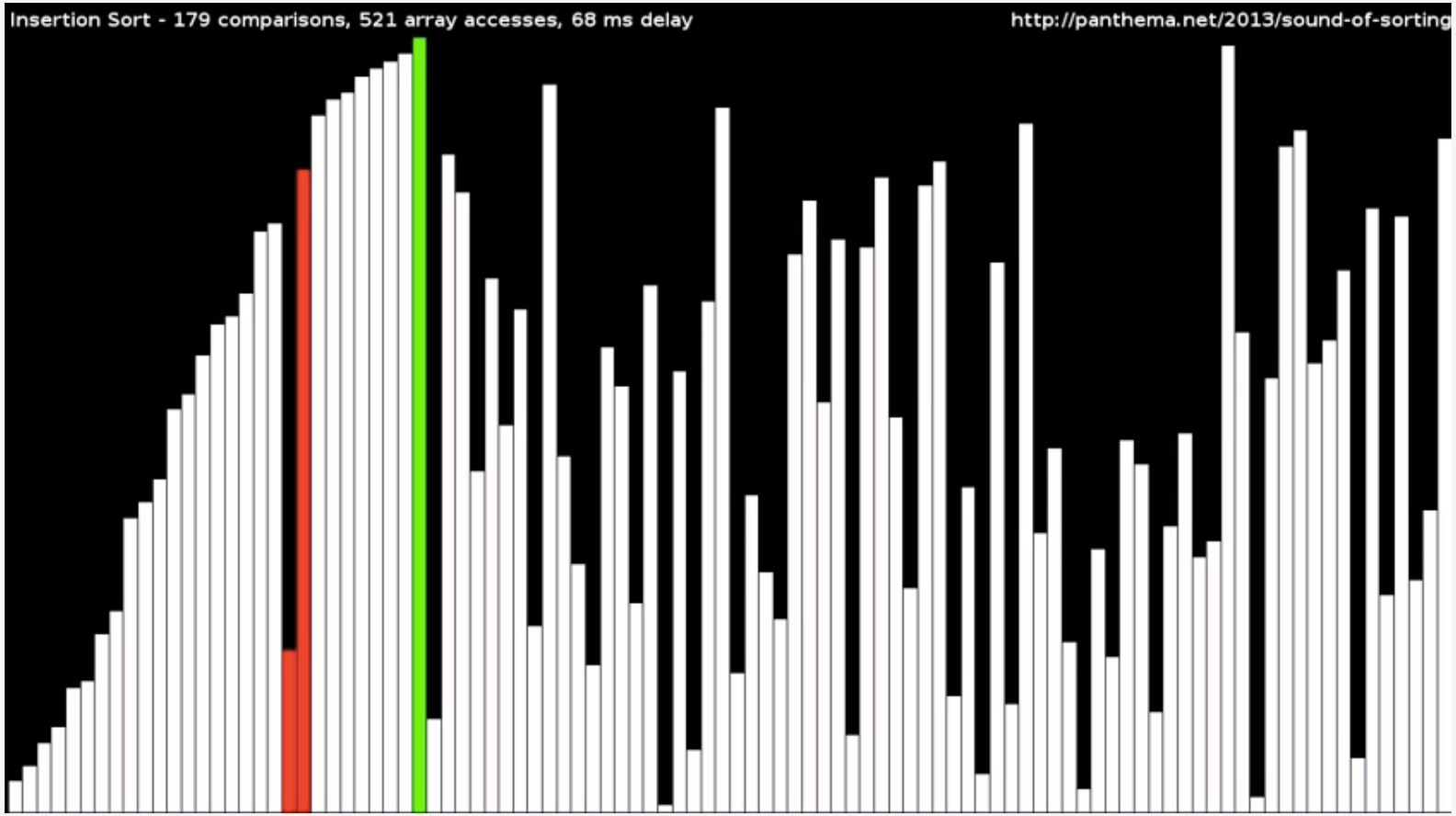


## Pop quiz 0 on sorting

Q. What's the most efficient way to sort 1 million 32-bit integers?

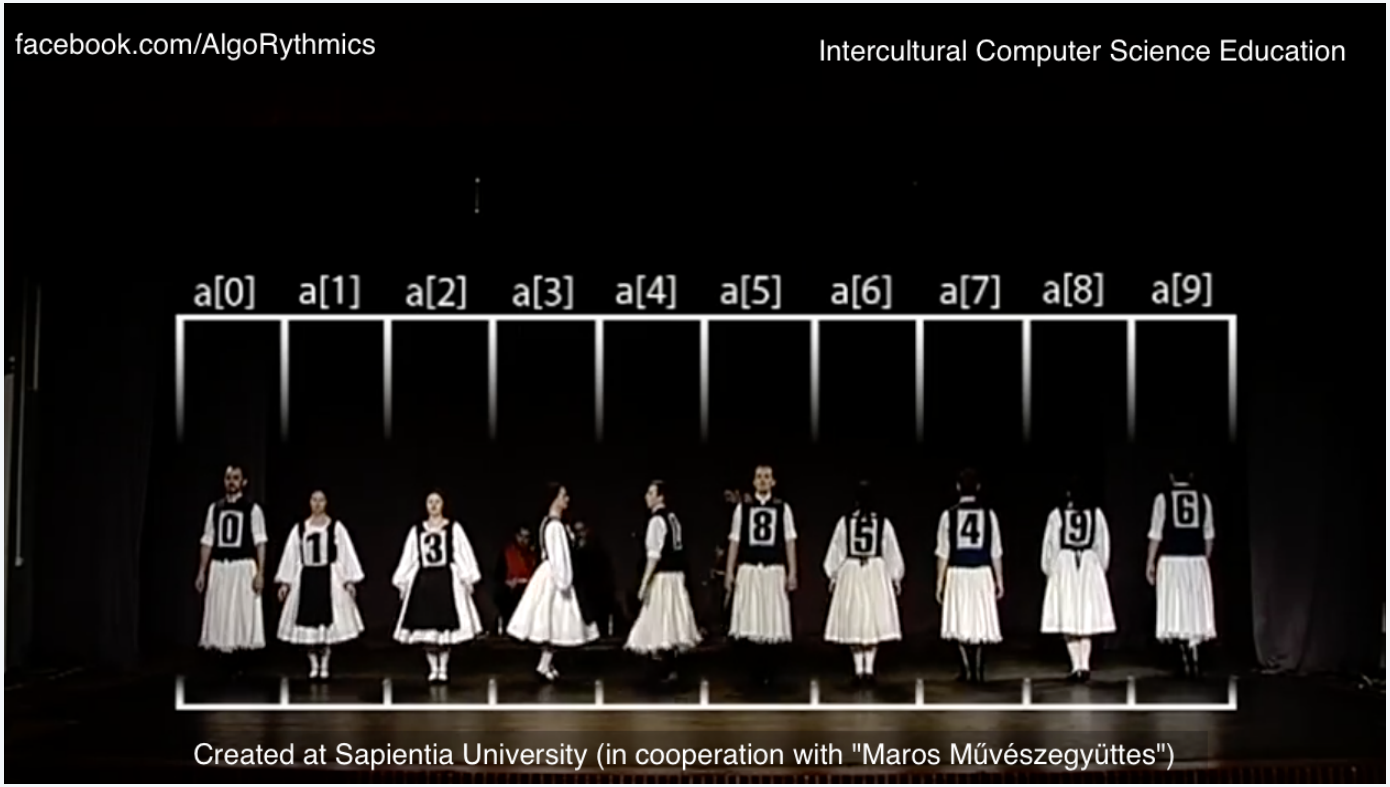
# Insertion Sort

https://www.youtube.com/watch?v=8oJS1BMKE64 4:03

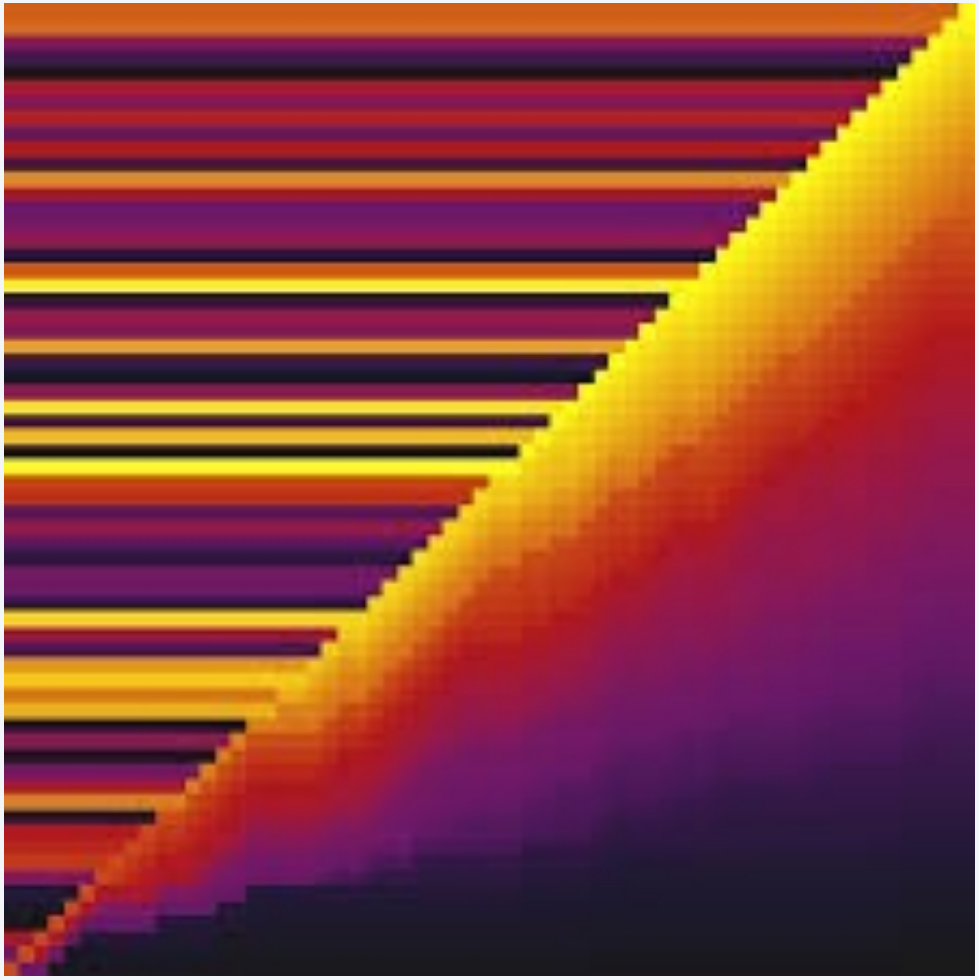


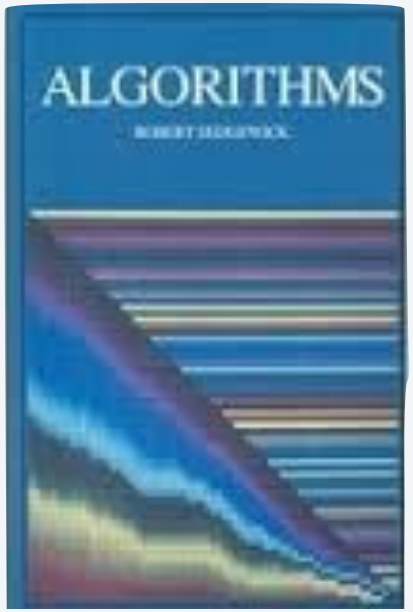
# Insertion Sort with Folk Dancers

https://www.youtube.com/watch?v=ROalU379l3U 4:03



## Insertion Sort





# Conway's game of life

A cellular automaton

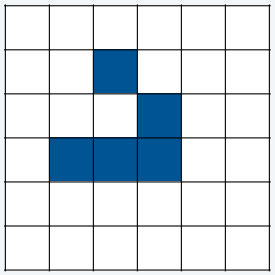
- Cells live and die in an infinite square grid.
- Time proceeds in discrete steps.

Survival. Each cell lives or dies depending on its 8 neighbors:

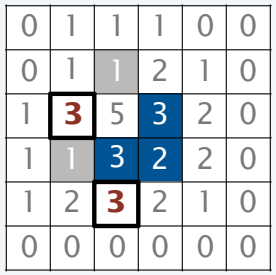
- Too few neighbors alive? (0 or 1) Die of loneliness.
- Number of living neighbors just right (2 or 3) Survive to next generation.
- Too many neighbors alive? (more than 3) Die of overcrowding.

Birth. Cell born when it has exactly 3 living neighbors.

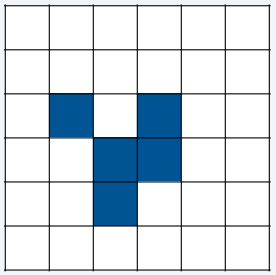
John Horton Conway



*time* t




*living neighbors*

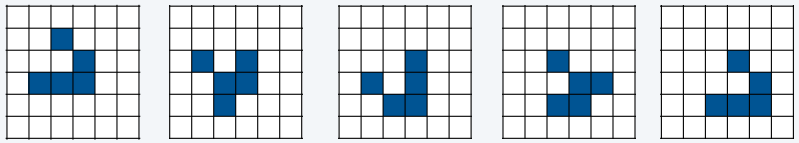


*time* t+1

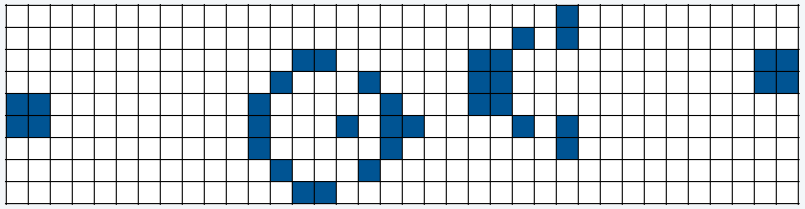
# Conway's Game of Life

Lesson. Simple rules can lead to complicated behavior

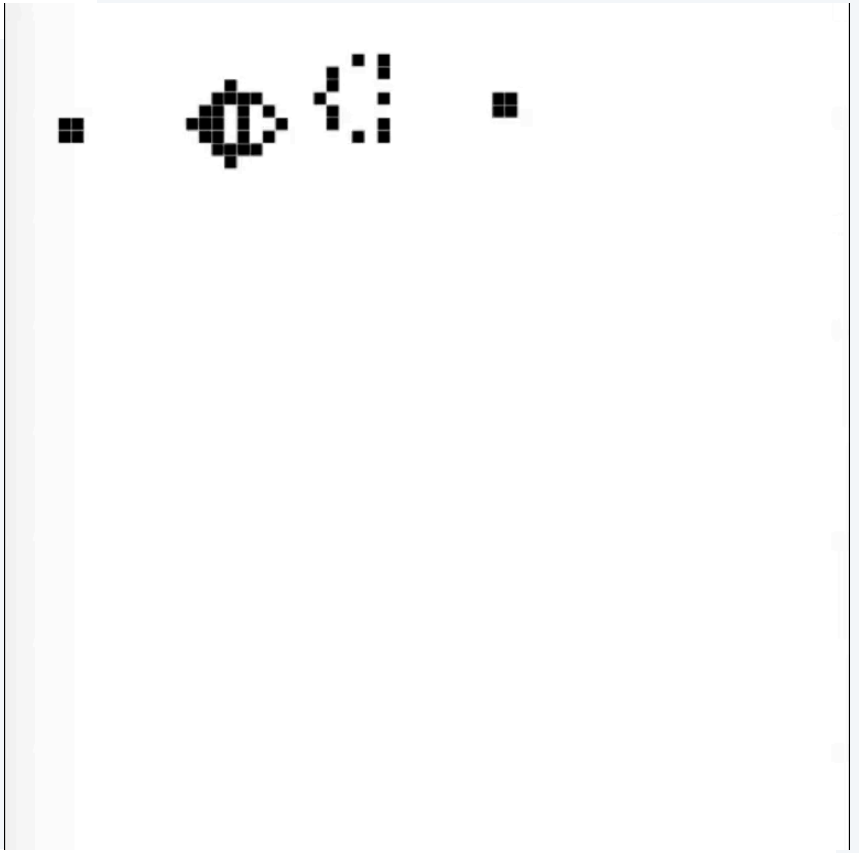
Example 1. Glider



Example 2. Glider gun (generates gliders)



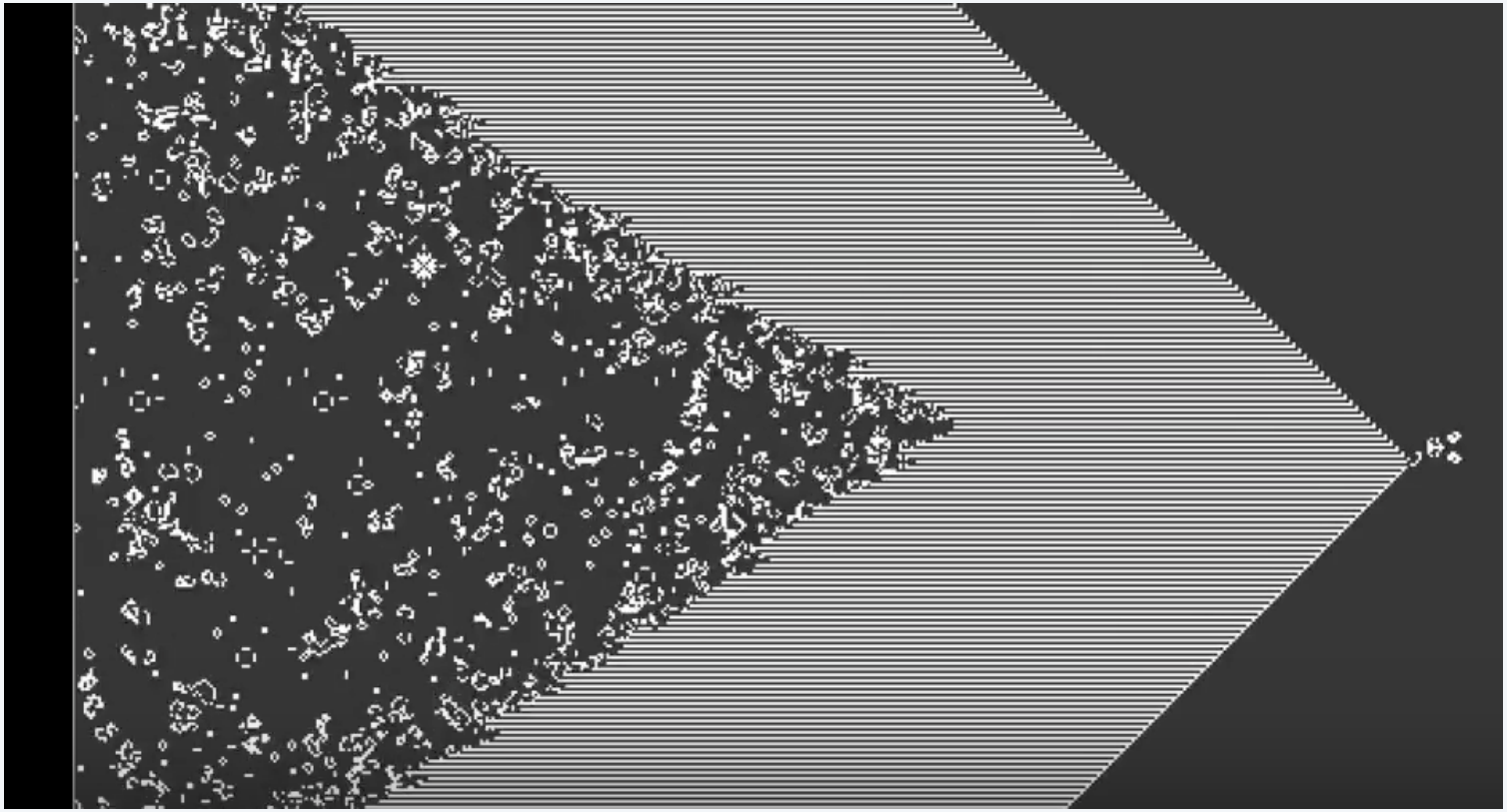
Example 3. Glider gun breeder (generates glider guns)



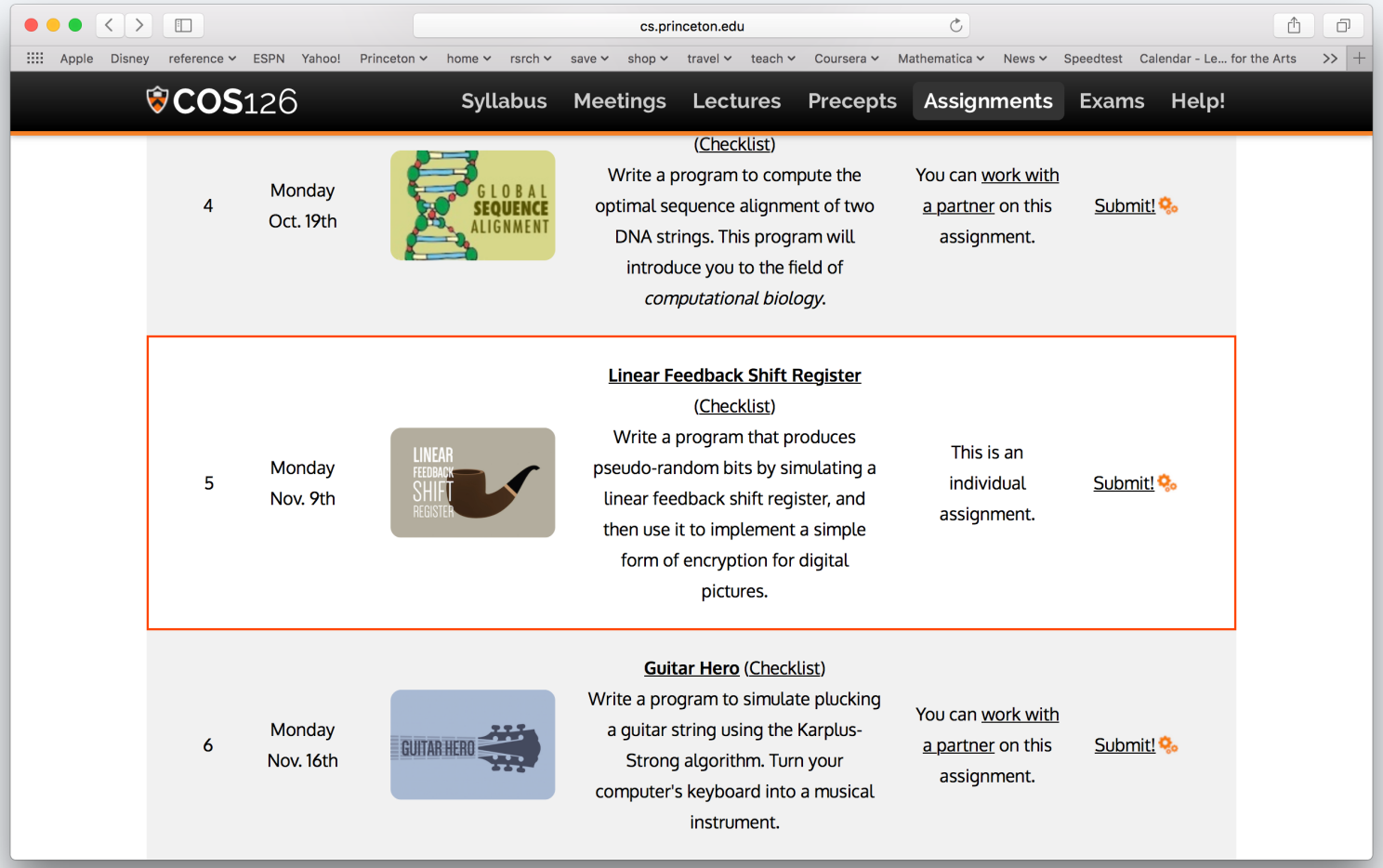
Note. YOU can write a program for the game of life (might have been an assignment).

# Epic Game of Life

https://www.youtube.com/watch?v=C2vgICfQawE 6:32



# Guitar Hero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COS126
Syllabus Meetings Lectures Precepts Assignments Exams Help!
(Checklist)
4 Monday Oct. 19th
GLOBAL SEQUENCE ALIGNMENT
Write a program to compute the optimal sequence alignment of two DNA strings. This program will introduce you to the field of computational biology.
You can work with a partner on this assignment.
Submit!
Linear Feedback Shift Register
(Checklist)
5 Monday Nov. 9th
LINEAR FEEDBACK SHIFT REGISTER
Write a program that produces pseudo-random bits by simulating a linear feedback shift register, and then use it to implement a simple form of encryption for digital pictures.
This is an individual assignment.
Submit!
Guitar Hero (Checklist)
6 Monday Nov. 16th
GUITAR HERO
Write a program to simulate plucking a guitar string using the Karplus-Strong algorithm. Turn your computer's keyboard into a musical instrument.
You can work with a partner on this assignment.
Submit!

# Guitar Hero on Steroids (Animusic)

https://www.youtube.com/watch?v=hyCIpKAIFyo 3:29

## Momentum (2015 SIGGRAPH)