

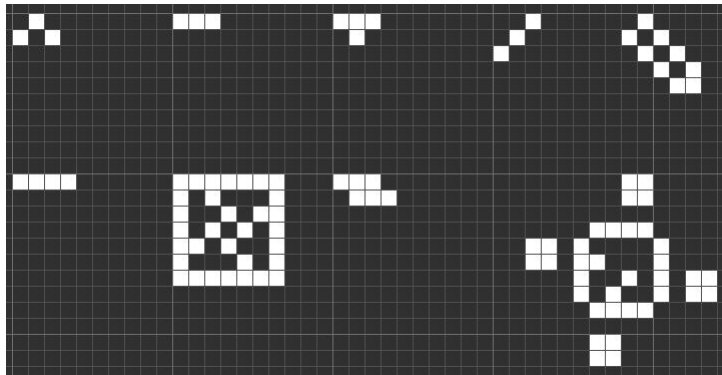
Math Circle – Life

Reminder about the rules of Life:

- You have an infinite board of small square called “cells.” Each cell can be either **alive** (on) or **dead** (off) at any time. Each cell has eight neighbors (on all sides and diagonally)
- On each tick, any living cell with **less than two** living neighbors is lonely and dies.
- On each tick, any living cell with **more than three** living neighbors is overcrowded and dies.
- Living cells with **two or three** living neighbors stay alive.
- A dead cell with **exactly three** living neighbors is born and becomes alive.

Problems

1. Try to see what happens to these patterns for a few generations.



2. Did you think those were easy? Then this shouldn't be too much harder:



3. Can you find some patterns that...

- (a) ...don't change at all? (A pattern like this is called “stable” or a “still life.”)
- (b) ...change back and forth between two states? What about three or more states? (These are called “oscillators.”)
- (c) ...move the board in some direction? (“gliders”)
- (d) ...keep on growing forever?
- (e) ...take a very long time to become stable or extinct?

Play around with different patterns! See what other interesting things you can discover.