Coding Dojo: Conway's Game of Life Kata

What is Conway's Game of Life?

Conway's Game of life is a simulation of 'life' which takes place on a 2D grid. Depending on the needs of the simulation, the grid may be infinite or finite. For this Kata, we'll assume all grids are finite. Each cell in the 2D grid will always be in one of two states: on or off. The simulation is run over the course of a specified number of time steps. At each time step, each cell is updated according to 4 rules:

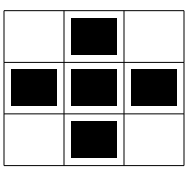
1. Any live cell with fewer than two live neighbors dies, as if caused by under-population.
2. Any live cell with two or three live neighbors lives on to the next generation.
3. Any live cell with more than three live neighbors dies, as if by overcrowding.
4. Any dead cell with exactly three live neighbors becomes a live cell, as if by reproduction.

What is the input?

The input will be in two parts. The first is a positive integer representing the number of time steps the simulation should run. This can be specified however you like. The easiest method will probably be as a command line argument or as a value stored in the input file. The second is a grid file. For this Kata, a 2D grid will be specified in one of two ways:

.rle file:

> This is a Run Length Encoding file. It is an ASCII text file specifying a string for which repeating characters are condensed into a single instance of the character preceded by an integer count for the number of times that character appears. If a single instance of a character appears, the character is written without a preceding count. Additionally, newline characters are specified with the '$' character, and the end of the string is specified by the '!' character.
>
> In the case of this Kata, all provided .rle files are created by Golly, an open source Game of Life tool. Golly uses the 'b' character to represent the 'off' state and 'o' to represent the 'on' state.
>
> The string itself is preceded by a line containing the dimensions of the 2D grid represented by the string, as well as the rule set to apply to the grid. Golly supports different rule sets for the Game of Life, but we will stick with the original for this Kata.
>
> For example, the following text in a .rle file:
>
> x = 3, y = 3, rule = B3/S23
> bob$3o$bob!
>
> Produces the following data on a Game of Life grid:



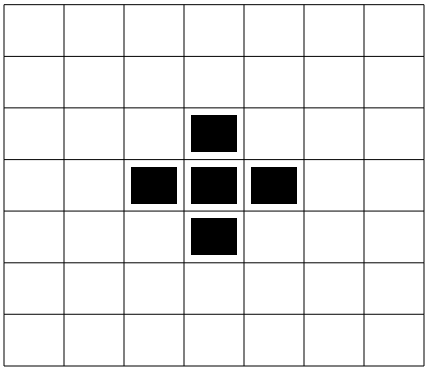
.txt file

The second is a simple ASCII text file speciying the grid character by character. This format is a bit easier to parse, but creates bigger files. The first line of the file contains the X and Y dimensions of the grid. All subsequent lines are used to define the grid. Apart from the first line, only three characters are used: '0', '1', and '\n'. '0' and '1' specify the 'off' and 'on' states respectively, and the '\n' character represents the end of a horizontal line. Most text editors recognize the '\n' as the newline character, so a grid specified in this format will appear as a grid in most text editors.

For example, the following text in a .txt file:

```
7 7
0000000
0000000
0001000
0011100
0001000
0000000
0000000
```

corresponds to the same grid as the .rle data above, but with a padding of 2 'off' rows and columns on each side:



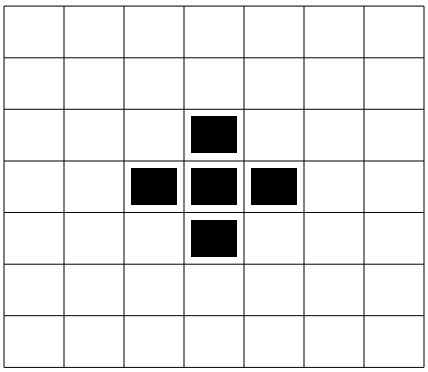
Other formats are acceptable, but example input will only be provided in the above formats.

What is the expected output?

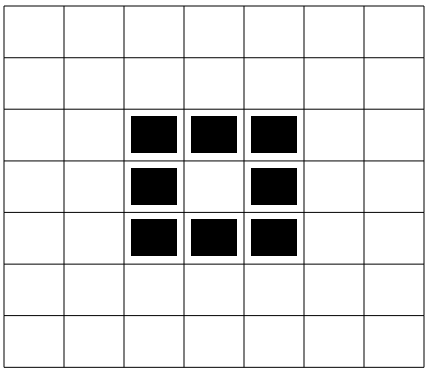
Ideally the expected output is in one of the same formats as specified for input. Other formats are acceptable, provided you're capable of convincing others that your output is correct.

The output should specify the state of the simulation after using the input file as the starting state and running the simulation the specified number of time steps.

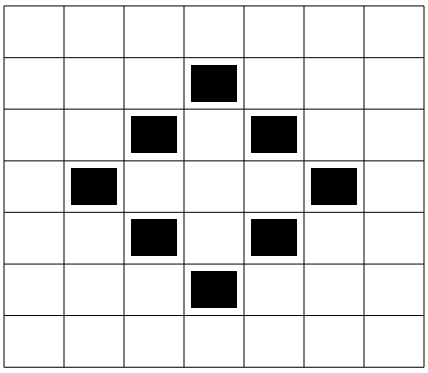
For example:
with a starting state:



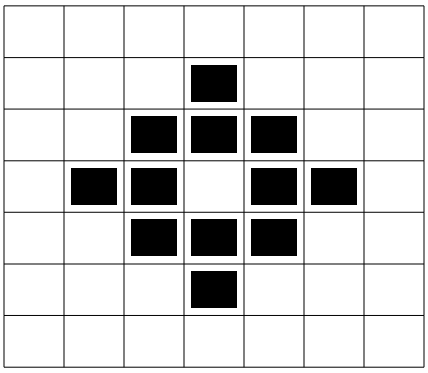
After 1 time step:



After 2 time steps:



After 3 time steps:



Where can I find out more?

Wikipedia article on Conway's Game of Life:
http://en.wikipedia.org/wiki/Conway's_Game_of_Life

Golly (open source Game of Life tool):
http://golly.sourceforge.net/

Extensive community centered around Game of Life:
http://conwaylife.com/

My Github page for this Kata:
https://github.com/scothalverson/CodingDojo