Cellular Automata Programs
Witt Sem 100

A number of Cellular Automaton Programs can be found at

Q:\Mathematics\Classes\WittSem-Infinity\CellularAutomata

One Dimensional Automata Software

23CellularAutomata100.exe simulates 100 generations for a 1 dimensional cellular automaton (above) using a 100 x 100 grid. (The “23” refers to 2 states and 3 cell neighborhoods). Use the mouse to select rules (on the right) by clicking on/off the appropriate boxes. Each rule is represented as a 3-bit binary string (see Peak and Frame page 309) where ■ ■ ■ is represented by 100, ■ ■ ■ is represented by 011 etc. Recall that ■ ■ ■ means that if at the current generation the left cell is off while the center and right cells are on, then for the next generation the center cell will be on. The program also computes Wolfram’s Number for the automaton, the number being the sum of the individual rules whose numbers appear to the right. (Can you figure out the pattern used to assign values to rules?)

Click on the row of boxes over the display to initialize; Run, Step, Clear and Quit should all be obvious.

A second version, 23CellularAutomata400.exe uses a finer, 400 x 400 pixel grid. Instead of a Step button, a Random button generates an initial configuration.

There is a 3rd program called CELLS25A.EXE is an older MS-DOS based program (written in Pascal) which simulates 2-D automata using 32 rules that make use of the two cells on either side of a cell. The
interface is somewhat different than 2DCellularAutomata100.exe in that there is a separate window to select rules before the grid is displayed. On the graphic display using the mouse click on the top row to initialize the automaton OR use the random option to generate a random initialization. A fourth program CELLS23A.EXE is a similar MS-DOS program but written for 3-cell neighborhoods like 23CellularAutomata.exe.

Conway's Game of Life

Life50WrapAround.exe simulates Conway's Game of Life on a 50 x 50 grid with wrap-around (there is also a version for a 100 x 100 grid – Life100WrapAround.exe). There is also a Life50KleinBottle.exe which assumes a non-oriented grid based on a Klein bottle.

You can turn on/off individual cells by clicking them. Step will advance one generation. Start/Stop should be obvious as is Clear, Reset and Quit.

There is another version of Conway’s Game called Red Blue Life (RedBlueLife50.exe and RedBlueLife100.exe) where the cells are colored either Red or Blue (this was done way before the last election). The rules are the same except that for the birth rule, the majority color determines the color of the new cell. Moreover there is a conversion rule – a living cell always converts to the color of the majority of its neighbors (try a 2 x 2 block half red, half blue).

The set up is the same except for two additional buttons – Red and Blue which select the color to use when initializing the board.
Two Dimensional Automaton Software

2 D Cellular Automata (2DCellularAutomataV1.exe) presents a 100 by 100. It allows the user to choose which outer totalistic rules to use.

There are 9 sets of rules labeled 0 – 8 for the number of alive cells that could surround a cell. If the first block is checked (on) then if the (center) cell is alive, it will stay alive for the next generation. If the second block is checked (on), then if the (center) cell is dead, it will be alive for the next generation. The configuration of totalistic rules given in the above example are the rules for Conway's Game of Life.
Below is 2DCellularAutomataV2.exe (version 2) which has a cleaner rule set up (S for Survive, B for Born)