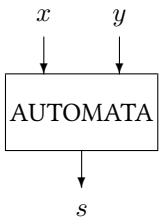
Block AUTOMATA

The AUTOMATA block calculates an elementary cellular automaton (https://en.wikipedia.org/wiki/Elementary_cellular_automaton). The first row (x = 0) is random, every following row is calculated from the previous one with the given rule and periodic boundaries.



Name	AUTOMATA
Function	fb0087
Inputs	2
Outputs	1
Parameters	2
Strings	0
Group	S

Inputs

1	Row x, from 0 on, incremented by 1
2	Cell y in row x, between 0 and 1023

Outputs

1	State of cell y in row x, 0 or 1

Parameters

1	Wolfram code of the rule, between 0 and 255
2	Seed, 0 for a different random first row at each run, 1 for a single bit in the middle of the first row

Strings

None



Each cell of an elementary cellular automaton is either 0 or 1. The cells of the first row ($x = 0$) are random, except with seed 1: the first row then has a single bit in its middle. Since the width of the row is only known once the first row is complete, this bit is set at

the beginning of row $x = 1$, so the output of the first row is all zeros. Every following row is calculated from the previous one: the new state of cell y depends on the states of cells $y - 1$, y and $y + 1$ in the previous row, with periodic boundaries. These three bits form a number n between 0 and 7, and the new state is bit n of the rule.

The width of the rows is defined by the first row, so the calls must loop over all cells y of row x before row $x + 1$, typically with an outer DO block for x and an inner DO block for y.

Rule 110 is Turing complete, rule 30 looks chaotic, and rules 90 and 150 draw Sierpinski triangles. See https://en.wikipedia.org/wiki/Elementary_cellular_automaton.