Parabola Volume 12, Issue 3 (1976) THEMATICAL GAMES

LIFE Omo Caitemen

The game "Life", invented by British mathematician John Conway, is, like Solitaire, a game you can play by yourself. It can be played using pencil and paper, but you may find it easier to use flat counters of two colours on a board laid out in squares. (We shall discuss the game as if this is what you are doing.)

Rules of the game: The idea of the game is to start with a simple arrangement of

counters, one to a square, and then to observe how this pattern changes according to the following laws. Note that each square of the board has eight neighbouring squares (marked N) and counters on neighbouring squares will be called neighbours of the original square.

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-	N	N	N	-

(1) Survival: Every counter with 2 or 3 neighbours survives to the next generation.

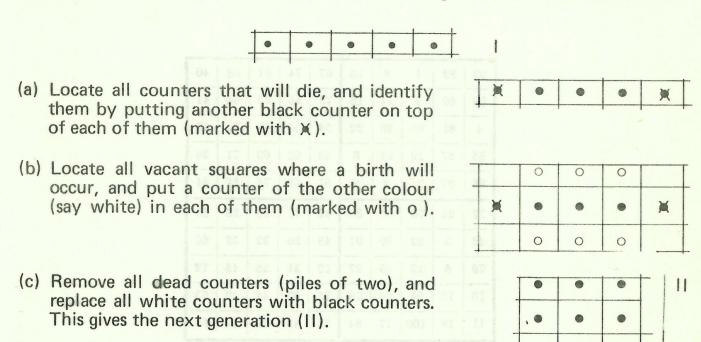
(2) Death: Each counter with 4 or more neighbours dies (and is removed) from over-crowding, while each counter with fewer than 2 neighbours dies from isolation.

(3) Birth: A birth occurs in any vacant square exactly 3 of whose neighbouring squares are occupied.

Note that all births and deaths occur simultaneously. Together they constitute

a single generation in the life of the pattern.

To understand this last comment, it may help to study the life and growth of one particular pattern of five counters in a row using black counters marked •.



Steps (a), (b), (c) are now repeated to give the next and subsequent generations.

Questions:

(1) What happens to the pattern in the example as time goes on?

(2) Can you find a stable pattern, that is one which does not change from one generation to the next?

(3) Some patterns have a "period of 2", for example • • • . That is, every second generation they are the same. Can you find any others?

(4) Can you find a pattern with period 3?

(5) Are there any patterns which do not die and which do not evolve into stable or recurring states?

Again, we offer prizes for the best contributions.

SOLITAIRE

Unfortunately in our last issue the diagram of the solitaire board was mis-printed. The board should have looked like this:

		0	0	0		
		0	0	0		
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
		0	0	0	like	
		0	0	0		1,0

Consequently, question 2 did not make too much sense. Nevertheless, all other questions could have been answered, and the response was disappointing. The only person to send in a solution to the problem of ending up with just one peg in the centre hole (on the misprinted board) was Peter Doyle of Penrith High who wins \$1 plus one year's free subscription to Parabola. His solution was

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(1) $E2 \rightarrow E4$ (2) $G3 \rightarrow E3$ (3) $E4 \rightarrow E2$ (4) $E6 \rightarrow E4$ (5) $C5 \rightarrow E5$ (6) $E4 \rightarrow E6$ (7) $D3 \rightarrow D5$ (8) $A5 \rightarrow C5$ (9) $D5 \rightarrow B5$ (10) $C3 \rightarrow C5$	of the petition of the petitio	(11) (12) (13) (14) (15) (16) (17) (18) (19) (20)	B5 → B3 → A3 → A5 → D5 → D7 → C5 → F7 → F6 →	D5 B5 A5 C5 E5 D5 E5	2b) x ly by quite Parab futu indica	(21) (22) (23) (24) (25) (26) (27) (28) (29) (30)	F4 → D7 → D5 → F6 → F1 → D1 → F1 → D2 →	F6 D5 F5 F4 F3 F2 F1 F3	2b th ain ain try ind ion	(31) (32) (33) (34) (35) (36) (37)	$ \begin{array}{c} 15 \rightarrow G5 \\ G5 \rightarrow G3 \\ 14 \rightarrow G4 \\ H3 \rightarrow F3 \\ F2 \rightarrow F4 \end{array} $

The offers of prizes for further contributions (to the corrected version) still stand, and we look forward to hearing from you.