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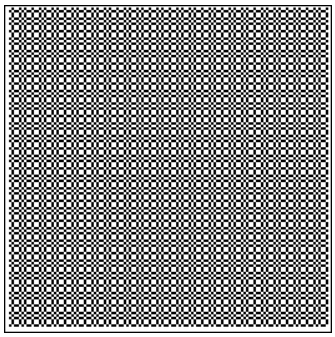
Rabbit Sequence



A sequence which arises in the hypothetical reproduction of a population of rabbits. Let the substitution system map $0 \to 1$ correspond to young rabbits growing old, and $1 \to 10$ correspond to old rabbits producing young rabbits. Starting with 0 and iterating using string rewriting gives the terms 1, 10, 101, 10110, 10110101, 1011010110110, ... A recurrence plot of the limiting value of this sequence is illustrated above.

Converted to decimal, this sequence gives 1, 2, 5, 22, 181, ... (OEIS A005203), with the nth term given by the recurrence relation

$$a(n) = a(n-1)\,2^{F_{n-1}} + a(n-2),$$

with $a(0) = 0$, $a(1) = 1$, and F_n the nth Fibonacci number.

The limiting sequence written as a binary fraction $0.1011010110110\ldots_2$ (OEIS A005614), where $(a_n \ldots a_1\, a_0)_2$ denotes a binary number (i.e., a number written in base 2, so $a_i = 0$ or 1), is called the rabbit constant.

SEE ALSO:
Fibonacci Number, Rabbit Constant, Thue-Morse Sequence

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Referenced on Wolfram|Alpha: Rabbit Sequence

CITE THIS AS:
Weisstein, Eric W. "Rabbit Sequence." From *MathWorld*--A Wolfram Web Resource.
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