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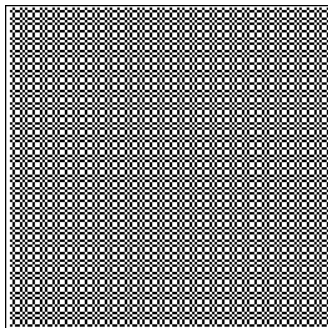
Created, developed, and
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Rabbit Sequence



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A **sequence** which arises in the hypothetical reproduction of a population of rabbits. Let the **substitution system** map $0 \rightarrow 1$ correspond to young rabbits growing old, and $1 \rightarrow 10$ correspond to old rabbits producing young rabbits. Starting with 0 and iterating using **string rewriting** gives the terms 1, 10, 101, 1011, 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 n th 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 n th **Fibonacci number**.

The limiting sequence written as a **binary fraction** $0.1011010110110 \dots_2$ (OEIS [A005614](#)), where $(a_n \dots a_1 a_0)_2$ 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](#)

REFERENCES:

- Davison, J. L. "A Series and Its Associated Continued Fraction." *Proc. Amer. Math. Soc.* **63**, 29-32, 1977.
Gould, H. W.; Kim, J. B.; and Hoggatt, V. E. Jr. "Sequences Associated with t -ary Coding of Fibonacci's Rabbits." *Fib. Quart.* **15**, 311-318, 1977.
Schroeder, M. *Fractals, Chaos, Power Laws: Minutes from an Infinite Paradise*. New York: W. H. Freeman, p. 55, 1991.
Sloane, N. J. A. Sequences [A005203/M1539](#) and [A005614](#) in "The On-Line Encyclopedia of Integer Sequences."

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<http://mathworld.wolfram.com/RabbitSequence.html>

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