

# New fundamental discovery of the reverse Fibonacci sequence

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## Introduction

The Golden Ratio and the Fibonacci sequence are well-known mathematical knowledge that humanity has come to know in the earliest times and whose significance is only gradually revealed. The use of the Golden Ratio and the Fibonacci sequence can be observed in nature in different places. The Golden ratio has even been applied in art and architecture, which proves that people feel and are fascinated by the beauty that radiates from the Golden Ratio. In the following article we will expand the knowledge of the Golden Ratio and the Fibonacci sequence and we will get to know that we have so far learned only half of the truth about the Golden Ratio.

Take the known Fibonacci sequence 1, 1, 2, 3, 5, 8, 13, 21, 34, ... that we get by the next member of the sequence as a result of the sum of the two previous members. When we start with the first two members like 1 and 1, the next member is the sum of two, that is 2, the next member is the sum of 1 and 2, that is 3, etc. This step can be repeated any time until infinity. The Fibonacci sequence is an increasing sequence, so the numbers of the Fibonacci sequence increase to infinity. The ratio of the two following members of the Fibonacci sequence approximates to the known Golden Ratio  $\varphi$ .

## Reverse Fibonacci sequence

Let's look at the numerical sequence we get when we make a sum of the Fibonacci numbers and the digits of the Fibonacci number. It is a great surprise to see that the new line created by this is a repetition of a 24-digit sequence. Let us only consider this 24-digit sequence and the first 24 Fibonacci numbers from the Fibonacci sequence. We see that the first 24 numbers of the Fibonacci sequence are increasing, and each number of the Fibonacci sequence corresponds to a single number of the sum of digits of the given number. Let's ask a question now. Is there a sequence of numbers that would suit the sum of digits of a given number according to the Fibonacci sequence but in reverse order? Yes, a new number sequence can be created that matches the reverse order of the sum of Fibonacci sequence digits. The situation is illustrated in Figure No.1

this new sequence is not random but is given by the formula

$$J_{(n+2)} = 8 * (J_{(n+1)} - J_n)$$

assuming that the first two members of the sequence are 0 and 1. Zero is the first member because for the sum of figures algorithm it is possible to mix 9 and 0 with the same result for adding digits in numbers.

The sequence derived from the reverse sequence of the sum of the digits of the first 24 numbers of the Fibonacci sequence and created by this formula I call the Golden Janicko sequence. Why "Golden" will be explained in the next text.

## Fibonacciho sequence

## Golden Janicko sequence

(reverse Fibonacci sequence)

|     |        |                   |                           |              |
|-----|--------|-------------------|---------------------------|--------------|
| 1.  | 1      | = 1 =             |                           |              |
| 2.  | 1      | = 1 =             |                           |              |
| 3.  | 2      | = 2 =             |                           |              |
| 4.  | 3      | = 3 =             |                           |              |
| 5.  | 5      | = 5 =             |                           |              |
| 6.  | 8      | = 8 =             |                           |              |
| 7.  | 13     | (1+3) = 4 =       |                           |              |
| 8.  | 21     | (2+1) = 3 =       |                           | etc.         |
| 9.  | 34     | (3+4) = 7 =       | (5+7+8+4+0+9+2+0+1+6+6+4) | 578409201664 |
| 10. | 55     | (5+5) = 1 =       | (8+4+7+0+6+0+6+6+4+3+2)   | 84706066432  |
| 11. | 89     | (8+9) = 8 =       | (1+2+4+0+4+9+1+6+2+2+4)   | 12404916224  |
| 12. | 144    | (1+4+4) = 9 =     | (1+8+1+6+6+5+7+9+2+0)     | 1816657920   |
| 13. | 233    | (2+3+3) = 8 =     | (2+6+6+0+4+3+3+9+2)       | 266043392    |
| 14. | 377    | (3+7+7) = 8 =     | (3+8+9+6+1+1+5+2)         | 38961152     |
| 15. | 610    | (6+1+0) = 7 =     | (5+7+0+5+7+2+8)           | 5705728      |
| 16. | 987    | (9+8+7) = 6 =     | (8+3+5+5+8+4)             | 835584       |
| 17. | 1597   | (1+5+9+7) = 4 =   | (1+2+2+3+6+8)             | 122368       |
| 18. | 2584   | (2+5+8+4) = 1 =   | (1+7+9+2+0)               | 17920        |
| 19. | 4181   | (4+1+8+1) = 5 =   | (2+6+2+4)                 | 2624         |
| 20. | 6765   | (6+7+6+5) = 6 =   | (3+8+4)                   | 384          |
| 21. | 10946  | (1+0+9+4+6) = 2 = | (5+6)                     | 56           |
| 22. | 17711  | (1+7+7+1+1) = 8 = |                           | 8            |
| 23. | 28657  | (2+8+6+5+7) = 1 = |                           | 1            |
| 24. | 46368  | (4+6+3+6+8) = 9 = |                           | 0            |
| 25. | 75025  | (7+5+0+2+5) = 1   |                           |              |
| 26. | 121393 | (1+2+1+3+9+3) = 1 |                           |              |
| 27. | 196418 | (1+9+6+4+1+8) = 2 |                           |              |
|     | etc.   |                   |                           |              |

Figure No.1

## Golden Janicko ratio

In the Fibonacci sequence, when we divide two consecutive Fibonacci sequences, we get an approximation of the Golden Ratio number. If we divide two consecutive members of the Golden Janicko sequence we will find that this ratio approximates to the number

$$j = 6,828427112475 \dots$$

respectively,

$$\frac{1}{j} = 0,1464466094067 \dots$$

I name the number  $j$  the Golden Janicko ratio and I denote it by the letter  $j$ . The Golden Janicko ratio will be calculated exactly as follows

$$j = 4 + \sqrt{8} = 4 + \sqrt{2^3} = 6,828427112475...$$

## The significance of the Golden Janicko sequence and the Golden Janicko ratio

The meaning of the classical Golden Ratio is known as the ratio of the two parts of a line of size 1 that are to each other the same as the ratio of bigger part to the total length of the line. Thus when we express it mathematically

$$a : x = x : (a - x)$$

where  $a$  is the size of a line equal to 1 and  $x$  is the size of the larger part of the line. From this ratio we get the equation

$$x^2 + ax - a^2 = 0$$

at a line size  $a = 1$  we get a quadratic equation whose solution is the number of the Golden Ratio

$$x = \frac{1}{2} * (\sqrt{5} - 1) = 0,618033988...$$

That is the meaning of the Golden Ratio, which we can transform into different forms.

The meaning of the Golden Janicko sequence and the Golden Janicko ratio can be understood from the following example.

Suppose we count the number of mothers that will be multiplied in a binary way. So, at every step, we will count all the mothers, assuming that each mother has one offspring at each step, but it must again be the future mother. So we're going to watch the reproduction of females that give birth to one female at every step. Graphically, such reproduction can be represented as a binary tree and the number of females rises exactly according to formula  $2^n$ . To fulfill the condition of the Golden Janicko sequence, we need to correct this sequence in such a way that every third generation the original females, that have established the current generation will die. The situation is illustrated in Figure No.2

0  
1

Let's repeat the situation. At the beginning there is one mother-female founder. In the first generation we have the mother of the founder and her daughter. In the second generation, we already have a founding mother and three descendants. In the third generation, we have a founding mother and seven descendants. At this moment and step, in the third generation, the founder's mother dies and only her descendants continue to reproduce, and at the time of the founding mother's death, all her descendants become mothers of the founders of the first generation. And so the process is repeated. First generation founding mothers are further reproduced and, after three generations, the descendants of the founder mothers of the first generation die again, and the current descendants become mothers of founders of the second generation.

The growth of the number of the female population where the third generation dies the founding mothers expresses the Golden Janicko sequence. The ratio of the growth of this population is expressed by the Golden Janicko ratio. Thus, the growth of the female population under these conditions is equal to the exact number of  $j = 6,828427112475 \dots$  which is about 7 times the population growth for three generations without females dying.

This example we can modify to well known Fibonacci example with rabbits, where one pair of rabbits give birth in every step to next one pair of rabbits.

## Golden Janicko sequence analysis

As we have already mentioned, the Golden Janicko sequence is given by the formula

$$J_{(n+2)} = 8 * (J_{(n+1)} - J_n)$$

which represents the dying of founders in the third generation. However, what is the situation, if the founders die in the first generation, in the second generation or in the fourth or fifth, etc. We can generalize these considerations and introduce the general concept of the Janicko sequence of the x-th order and the general concept of the Janicko ratio of the x-th order, which is the expression of the growth of the general Janicko sequence of the x-th order. The situation is described in the following table.

| Order of Janicko sequence (x) | Formula                               | Janíčko ratio (growth ratio) |
|-------------------------------|---------------------------------------|------------------------------|
| 1                             | $J_{(n+2)} = 2 * (J_{(n+1)} - J_n)$   | sudden death                 |
| 2                             | $J_{(n+2)} = 4 * (J_{(n+1)} - J_n)$   | decreasing to 0              |
| 3                             | $J_{(n+2)} = 8 * (J_{(n+1)} - J_n)$   | 6,828427112475...            |
| 4                             | $J_{(n+2)} = 16 * (J_{(n+1)} - J_n)$  | 14,9282032302...             |
| 5                             | $J_{(n+2)} = 32 * (J_{(n+1)} - J_n)$  | 30,966629547...              |
| ...                           | $J_{(n+2)} = 2^x * (J_{(n+1)} - J_n)$ | ...                          |

Table No. 1

Formula for Janicko sequence of the x-th order is

$$J_{(n+2)} = 2^x * (J_{(n+1)} - J_n)$$

As can be seen from Table No. 1 The Golden Janicko sequence is Janicko sequence of the 3th order and Golden Janicko ratio is Janicko ratio of the 3rd order. Only the Golden Janicko sequence fulfills the condition that it is reverse to the Fibonacci sequence according to the procedure described above. The Golden Janicko sequence is the first minimal Janicko sequence with a constant rate of growth.

## Conclusion

The fundamental discovery of the reverse Fibonacci sequence, called the Golden Janicko sequence, is a small but important result of a broader research focusing on the new fundamental foundations of numerical theory and new fundamental foundations of theoretical physics. The significance of the Golden Janicko ratio is comparable and has the same strength as other fundamental numbers in mathematics such as the number  $\pi$ , the Euler number  $e$  or the classical Golden ratio  $\phi$ . It is to be expected that new fundamental formulas will be derived, which will contain the number of the Golden Janicko ratio and will link it to other fundamental numbers such as, for example, number  $\pi$  or Euler  $e$ . The Golden Janicko sequence and the Golden Janicko ratio is in close relationship with the classic Golden Ratio and the Fibonacci sequence that we come across in nature. The number of Golden Janicko ratio is approximately 7. We realize that number 7 is often found in the real world. We have 7 basic colors of rainbow, 7 basic chakras in man, we split time for 7 days a week, etc. The Golden Janicko ratio now reveals that it is no coincidence that the number 7 plays such an important role. The number seven embodied in the Golden Janicko Ratio is now derived directly from mathematical formulas and its basic meaning is understood. It is no coincidence that in real life we see that parents usually do not live longer than the third generation of offspring. As if the nature itself has programmed the length of life. Now it is even confirmed by pure mathematics. So, we can think that the Golden Janicko sequence and the Golden Janicko ratio are related to the rate of development and growth, with division and flow of time. We can assume that in the future, Golden Janicko ratio will be discovered and used in calculations in quantum and nuclear physics, cosmology, chemistry, medicine, biology and others application fields. The classical Golden Ratio is vibrating in number 5. The Golden Janicko ratio is vibrating in number 2.  $2 + 5 = 7$ . The discovery of the Golden Janicko sequence and Golden Janicko ratio has revealed the second half of the truth about the Golden Ratio, that humanity has known until now. Let's hope that significance of this discovery will be seriously recognized.

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