Is there a Similarity between Fibonacci Sequence and Euler’s Number with Respect to Quantum Perspective Model?

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Abstract- According to Quantum Perspective Model, this article studies whether there is a link between the Euler’s numbers and the Fibonacci series. When the digits of the Euler’s number after the comma are converted from decimal(10) number base system to binary(2) number base system, it corresponds to the number in the Fibonacci series. (0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55…) [7]. From this point of view, when the first hundred digits of the Euler’s numbers after the comma were calculated, the number “55” (ten times) in the Fibonacci series was found, in particular. Besides, the eleventh number in the Fibonacci series is also “55”. In other words, the approximate unchanged numbers of the golden ratio numbers after the comma can be reached for the first time after dividing them from “55” to “34” (1.618). In sum, Euler’s numbers are not only attributed to the Fibonacci series in mathematics, but also attributed to the golden ratio in nature.

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I. Euler’s Numbers and Golden Ratio

Euler’s numbers are e: 2,718281828459045…[1]

The starting point of this study was found as follows. When the first fifteen digits of the number “e” after the comma are subtracted from a quadrillion, the first three digits of the numbers obtained at the result are ”618”. Also, the golden ratio numbers include “618”, too. (Remember, it is approximately 1,618) (For more information about “618” and biochemistry [6]) In fact, in the digits after ”618” in the result, Euler’s numbers are the same as the digits after the first three digits after the comma (281828459045).

Fibonacci series : 0,1,1,2,3,5,8,13,21,34,55… [7]

The golden ratio has the continued fractions (1/1, 2/1, 3/2, 5/3, 8/5, 13/8, 21/13, 34/21, 55/34…etc) are ratios of successive Fibonacci numbers. [7]

The starting point of the numbers in the Fibonacci series is the Pascal triangle, which is also formed by the exponents of the eleven “11” digit. Namely, From Fibonacci series, the number of ”55” is the eleventh(11) number. Another mysterious point is that if you calculate the diagonals of this triangle. the sum of the numbers in the diagonals will give you the Fibonacci sequence [1]. (1,1,2,3,5,8,13,21,34,55) [7]. Namely, the value of a row is a power of 11. [3]

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II. Calculation of Euler’s Numbers from Decimal base System (10) to Binary base System (2) and Vice Versa

Table 1: The representation of decimal numbers in the binary base and vice versa

| DECIMAL | BINARY  |
|---------|---------|
| 1       | 101     |
| 2       | 10       |
| 3       | 11       |
| 4       | 100      |
| 5       | 101      |
| 6       | 110      |
| 7       | 111      |
| 8       | 1000     |
| 9       | 1001     |
| 10      | 1010     |
| 11      | 1011     |
| 12      | 1100     |
| 13      | 1101     |
| 14      | 10000    |
| 15      | 10001    |
| 16      | 10010    |
| 17      | 10011    |
| 18      | 10100    |
| 19      | 10101    |
| 20      | 10110    |
| 21      | 10111    |
| 22      | 11000    |
| 23      | 11001    |
| 24      | 11010    |
| 25      | 11011    |
| 26      | 11100    |
| 27      | 11101    |
| 28      | 11110    |
| 29      | 11111    |
| 30      | 100000   |
| 31      | 100001   |
| 32      | 100010   |
| 33      | 100011   |
| 34      | 100100   |
| 35      | 100101   |
| 36      | 100110   |
| 37      | 100111   |
| 38      | 101000   |
| 39      | 101001   |
| 40      | 101010   |
| 41      | 101011   |
| 42      | 101100   |
| 43      | 101101   |
| 44      | 101110   |
| 45      | 101111   |
| 46      | 110000   |
| 47      | 110001   |
| 48      | 110010   |
| 49      | 110011   |
| 50      | 110100   |
| 51      | 110101   |
| 52      | 110110   |
| 53      | 110111   |
| 54      | 111000   |
| 55      | 111001   |
| 56      | 111010   |
| 57      | 111011   |
| 58      | 111100   |
| 59      | 111101   |
| 60      | 111110   |
| 61      | 1000000  |
| 62      | 1000001  |
| 63      | 1000010  |
| 64      | 1000011  |
| 65      | 1000100  |
| 66      | 1000101  |
| 67      | 1000110  |
| 68      | 1000111  |
| 69      | 1001000  |
| 70      | 1001001  |
| 71      | 1001010  |
| 72      | 1001011  |
| 73      | 1001100  |
| 74      | 1001101  |
| 75      | 1001110  |
| 76      | 1001111  |
| 77      | 1010000  |
| 78      | 1010001  |
| 79      | 1010010  |
| 80      | 1010011  |
| 81      | 1010100  |
| 82      | 1010101  |
| 83      | 1010110  |
| 84      | 1010111  |
| 85      | 1011000  |
| 86      | 1011001  |
| 87      | 1011010  |
| 88      | 1011011  |
| 89      | 1011100  |
| 90      | 1011101  |
| 91      | 1100000  |
| 92      | 1100001  |
| 93      | 1100010  |
| 94      | 1100011  |
| 95      | 1100100  |
| 96      | 1100101  |
| 97      | 1100110  |
| 98      | 1100111  |
| 99      | 1101000  |
| 100     | 1101001  |

III. Calculation of Euler’s Numbers from Decimal base System (10) to Binary base System (2) and Vice Versa

The first hundred of Euler’s numbers are here:

e:2,71828182845904523536028747135266249775724709369995957496696762772407663035
354759457138217852516642742746

At first, Euler’s numbers of both digits after the comma was taken each time. For example, 71,82,81,82,84...and so on. Then these numbers are found in the binary number system in Table-1. (For instance, “71”, 1000111 and so on). Secondly, convert these binary numbers to decimal number base (For instance, “71” 1000111; 1000=8 and
Finally, all decimal numbers are subjected to the addition process, respectively. 

\[(8+7+2+4+2+17+2+4+2+5=55)\]

The result of the addition is "55".

| Euler's numbers: | 71 | 82 | 81 | 82 | 84 |
|------------------|----|----|----|----|----|
| Euler's numbers: | 100| 111| 10 | 100| 10 |
| Euler's numbers: | 8+ | 7  | +2+4+2 | +2 | +17 |
| Euler's numbers: | +2+4+2 | +5 | $EMPTY=55$ |

| Euler's numbers: | 84(more) | 59 | 04 | 52 | 35 | 36 | 02 | 87 |
|------------------|-----------|----|----|----|----|----|----|----|
| Euler's numbers: | 100 | 111| 01 | 11 | 100| 1000| 10 | 1 1000 |
| Euler's numbers: | 4+ | 3  | +2+3+ + 9+ | 2+ | 4+ | +8 | +3+ | +4+ |
| Euler's numbers: | +2 | +2+2 | $EMPTY=55$ |

| Euler's numbers: | 87(more) | 47 | 13 | 52 | 66 | 24 |
|------------------|-----------|----|----|----|----|----|
| Euler's numbers: | 11 | 101 | 11 | 11 | 10 | 100 | 1000 | 10 | 1 1000 |
| Euler's numbers: | 3+ | 11+ | +3 | +3+1+1+2+4 | +16 | +2+1+8 =55 |

| Euler's numbers: | 97 | 75 | 72 | 47 | 09 | 36 |
|------------------|----|----|----|----|----|----|
| Euler's numbers: | 11 | 00000 | 1 | 100 | 10 | 11 |
| Euler's numbers: | 1+16+ | 1 | +4 | +2 | +3 | +4 | +8 | +2 | +1+7 | +2+1 | +2+1 |
| Euler's numbers: | $EMPTY=55$ |

| Euler's numbers: | 99 | 95 | 95 | 74 | 96 |
|------------------|----|----|----|----|----|
| Euler's numbers: | 11 | 1000 | 11 | 101 | 1111 | 1 01 | 1111 | 100 | 10 | 1 |
| Euler's numbers: | 1+ | 8+ | +3+ | +1+1+15 | +1+1+15 | +4 | +2+2 | +1+1+8 =55 |

| Euler's numbers: | 96(more) | 69 | 67 |
|------------------|-----------|----|----|
| Euler's numbers: | 100000 | 100 | 00 | 101 | 10000 |
| Euler's numbers: | 32+ | 2 | +$EMPTY$+5 | +16 =55 |

| Euler's numbers: | 67(more) | 62 | 77 | 24 | 07 | 66 |
|------------------|-----------|----|----|----|----|----|
| Euler's numbers: | 11 | 111 | 110 | 10 | 01 | 101 | 11000 | 1 | 11 | 10000 |
| Euler's numbers: | 3+ | 7+ | +6+ | +2+1 | +7 | +1+8 | +1+3+16 =55 |

| Euler's numbers: | 66(more) | 30 | 35 | 35 | 47 | 59 |
|------------------|-----------|----|----|----|----|----|
| Euler's numbers: | 10 | 111 | 1000 | 11 | 1000 | 11 | 0111 | 11 | 111 | 01 |
| Euler's numbers: | 2+ | 7+ | +2 | +8 | +3 | +8 | +3 | +11 | +3+ | +7+1 =55 |

| Euler's numbers: | 59(more) | 45 | 71 | 38 | 21 | 78 | 52 |
|------------------|-----------|----|----|----|----|----|----|
| Euler's numbers: | 1 | 101 | 101 | 1000 | 111 | 100 | 110 | 101 | 01 | 100 | 11 | 10 | 11 | 01 |
| Euler's numbers: | 1+ | 5+ | +5 | +8 | +7 | +4 | +6 | +5 | +1 | +4 | +3 | +2 | +3 | +1 =55 |

**Notes**
Euler’s numbers: 52(more)  51          66             42          74              27       46
Euler’s numbers : 00 1 100 11 10000 10 10 100 10 10 110 11 10 10 10 10 10 100 10 10 10 10 10 10 10
Euler’s numbers : EMPT Y +1+4+3 +16 +2 +2 +2 +2 +4 +2 +2 +6 +3 +1+3 +2=55

IV. Conclusion

The most widely used number digit system today is decimal. But in this work, Euler’s numbers have been converted from decimal base system to binary number base system. Interestingly, the first number of Euler’s numbers is “2”. Binary numbers have only two digits (0 or 1) too [5].

According to Quantum Perspective Model[4], after calculating the first hundred digits of Euler numbers after the comma, the number” 55 ” (ten times) was found, especially in the Fibonacci series (0,1,1,2,3,5,8,13,21,34,55…) [7]. The 11th digit in the Fibonacci series is also “55”. The numbers of the this series can be reached through The Pascal Triangle with the exponents of this number 11. As a result, after calculating the first hundred of Euler’s numbers after the comma, the number” 55 ” has been obtained (ten times). It is the sign of the relationship between Euler’s numbers and Fibonacci series. During the calculation, the “EMPT Y” numbers “00’” are disregarded. According to the number-based system, the number” 00 ’” has no value, neither in the decimal nor in the binary-based system. According to binary encoding base system, on the case of current not passing, this means 0 (zero). [8] That’s why, it can be the reason of disregardence of “EMPT Y” “00’” numbers.

As described in the reviews by Mäkelä, and Annila, the Fibonacci sequence is for other mathematical model functions which have useful results. (Mäkelä and Annila, 2010): If Fibonacci numbers are found in Nature, Why not include them in Euler’s numbers? Or is it the difference how it discovers parameters in science in terms of the quantum perspective model, especially when the relevant unit of analysis is invariant numbers?

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