INTERESTING FORMULAS FOR THE FIBONACCI SEQUENCE

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Abstract

This article disseminates a series of new and interesting mathematical formulas for the fibonacci sequence as product of the investigations of the author since 2015.

Keys. Mathematical Formulas, New Formulas, Number Theory, Fibonacci Sequence, Interesting Formulas, Math.

FÓRMULAS

1) Constant of sum of inverse to the average of fibonacci numbers.

1/1+1/(3/2)+1/(5/2)+1/4+1/(13/2) +1/(21/2)+1/17+....+ = $\sum_{n=1}^{\text{Infinito}} \frac{2}{F_n + F_{n+1}}$ = **2.71977133248...**

2) Interesting formula for calculate Prime numbers with relation of Fibonacci sequence.

$$n * \left\lfloor \frac{\text{Mod[GCD[n, Fibonacci[(-1)}^{n} + \text{n]], 1 + n]}}{n} \right\rfloor$$

Para n >=2

DONDE:
GCD (MÁXIMO COMÚN DIVISOR), Mod (FUNCIÓN RESIDUO) FIBONACCI (ENÉSIMO TÉRMINO DE LA SUCESIÓN DE FIBONACCI), ⌊⌋ (FUNCIÓN PISO)

{2,11,19,29,31,41,59,61,71,79,89,101,109,131,139,149,151,
179,181,191,199,211,229,239,241,251,269,271,281,311,331,
349,359,379,389,401,409,419,421,431,439,449,461,479,491,
499,509,521,541,569,571,599,601,619,631,641,659,661,691,
701,709,719,739,751,761,769,809,811,821,829,839,859,881,
911,919,929,941,971,991,1009,1019,1021,1031,1039,1049,
1051,1061,1069,1091,1109,1129,1151,1171,1181,1201,1229,
1231,1249,1259,1279,1289,1291,1301,1319,1321,1361,1381,
1399,1409,1429,1439,1451,1459,1471,1481,1489,1499,1511,
1531,1549,1559,1571,1579,1601,1609,1619,1621,1669,1699,
1709,1721,1741,1759,1789,1801,1811,1831,1861,1871,1879,1889}

3) Formula for nth Fibonacci Number.

$$\text{a (n)} = \sum_{i=1}^{\infty} \left| \frac{\left\lfloor \frac{n-1}{\left\lfloor \frac{\log\left(\sqrt{5}\,(i+0.2)\right)}{\log(\phi)} \right\rfloor} \right\rfloor}{2\,n} \right| + 1$$

4) Formula for to test Fibonacci Numbers.

$$\mathbf{a(n)} = \sum_{i=1}^{\left\lfloor \frac{Log(\sqrt{5}*(n+0.2))}{Log(\varphi)} \right\rfloor} \left\lfloor \frac{\left\lfloor \frac{\varphi^n}{\sqrt{5}} + \frac{1}{2} \right\rfloor}{n} \right\rfloor$$

Si a(n)=1, entonces "n" es un Número Fibonacci, para toda n>1.

DONDE

$\lfloor \square \rfloor \rightarrow Función\ Piso\ (Floor)$

$\varphi^n \rightarrow Número\ Aúreo\ (GoldenRatio)$

5) Formula for to test Fibonacci Numbers based in Hessel's Formula.

$$\mathbf{a(n)} = \sum_{i=1}^{2} \left\lfloor \frac{\left[\sqrt{5n^2+4(-1)^i} \right]}{\sqrt{5n^2+4(-1)^i}} \right\rfloor$$

Si a(n)=1, entonces "n" es un Número Fibonacci, para toda n>1.

DONDE

$\lfloor \square \rfloor \rightarrow Función\ Piso\ (Floor)$

$[\square] \rightarrow Función\ Parte\ Entera\ (IntegerPart)$