Dear Neil:

Thanks for the announcement, copies of which I am continuing to send to everybody on my mathematics/physics mailing list. This includes a lot of IBM people. Eventually, everybody in INTERNET should be (hopefully) able to access your Encyclopedia.

But I doubt that your Encyclopedia is complete. I will eat my hat if you have the GENERATING FUNCTION for the series mentioned before:

1 3 5 15 17 51 85 255 257 771 1285 3855 4369 13107 21845 65535 65537...

which is Pascal's Triangle MOD 2 (Binary - converted to decimal numbers). Let me know if you have the generating function for the above sequence. (this is a deep secret I have shared only with a few people. I want to know if anybody else discovered the secret. I doubt it.)

Two types of "/f Pink Music" (or noise) sequences are:

1. The Tower of Hanoi sequence, 1 2 1 3 1 2 1 4 1 2 1 3 1 2 1...
   which is found in Pascal's Triangle, MOD 2, and

2. An analogous sequence based on Fibonacci numbers, which goes:
   1 2 1 3 2 1 4 1 3 2...

The Tribonacci series would be 1 2 1 3 1 2 1 4 2 1....

But in order to generate these sequences, you would have to know the secret.

There are an infinity of such Bonacci Sequences, each associated with a Bonacci convergent, derived from

\[ x^{n+1} - 2x^n + 1 = 0 \]

Solving this (unambiguous solutions only) for x, with n = 1,2,3...gives all of the Bonacci convergents, of which the Golden Ratio .618... is the most well known.

Among the infinity of Bonacci sequences, they rapidly approach the Binary sequence, also called the "Tower of Hanoi series", since being isomorphic with the Binary system found in Pascal's Triangle MOD 2, every 2^n_th number introduces a new term.

Sincerely,

Gary

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ALGORITHM FOR THE CHINESE REMAINDER THEOREM

ABSTRACT: To get even with all the texts which describe the theory behind the Chinese Remainder Theorem with few concrete examples and no concise set of rules, I have devised the following algorithm which does not rely on trial and error or pre-memorized numbers. Kindly refer to "Number Theory and It's History" by Oystein Ore, Dover, pages 240-248. There are a few examples in the text, but good luck trying to figure out a consistent set of rules!

(1) By way of example, given \( x \equiv 2 \) (Mod 3), \( x \equiv 3 \) (Mod 5), \( x \equiv 2 \) (Mod 7)
Find \( x \). (i.e. 2,3,2 are the remainders upon division by 3,5,7,.)
Let the divisors be \( m_1 \), \( m_2 \), \( m_3 \). Find the continued fraction forms of \( \frac{m_1}{m_2m_3} \), \( \frac{m_2}{m_1M_3} \), and \( \frac{m_3}{m_1m_2} \), so that the number of terms in the continued fraction form are even.

\[
= \frac{3}{35}, \quad \frac{5}{21}, \quad \frac{7}{15}
\]

To get the continued fraction forms, get out your pocket calculator, enter 3/35, and successively press the \( 1/x \) button while then subtracting the whole integer result. This generates the numbers 11, 1, 2, which has an odd number of terms, and we want an even number.

To get an even number, take the rightmost term and split it off into an integer plus a \( 1 \), = 11 1 1 1.

(2) Take the continued fraction terms in Rule #1, and underneath, write a \( 1 \) under the leftmost term (1 under the 11), under the next term write the term itself (1 under the 1), and for each successive entry, multiply the next number in the continued fraction form by the \( n \)-th generated number and add the \( n \)-th generated number:

- Continued fraction terms: 11 1 1 1 1
- Generated terms: 1 1 2 3

Record the next to last generated term, a 2 in this case.
Perform the same operations with 5/21 and 7/15.

5/21: = 4, 5
\[
\begin{array}{c|c}
4 & 5 \\
1 & 5 \\
\end{array}
\]

7/15: = 2, 7
\[
\begin{array}{c|c}
2 & 7 \\
1 & 7 \\
\end{array}
\]

(3) Fill in the box, \( x \equiv [ \quad ] + [ \quad ] + [ \quad ] \) Mod \( m_1m_2m_3 \)

In each bracket is the product of 3 numbers: the denominator in Rule (1), the accompanying remainder, and the number recorded in rule #2.

We have \( x = [(35)(2)(2)] + [(21)(3)(1)] + [(15)(2)(1)] = 233 \) (Mod 105)
or \( x = 23 \) (Mod 105). Answers restricted to numbers less than the product of the \( m \)'s.