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The Algorithm (3a +1) in the Problem of Computing $O(2^n)$

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Abstract In this article I demonstrate the Collatz conjecture that there are infinitely because there are infinitely many values of (a) magic in set of the integers numbers that lead directly to the cycle 4,2,1. With the algorithm (3a + 1) we have always one of the (a) magic. Another contribution of this paper is the demonstration for existing two equations for polynomial time of all 2^n. Finally the existence of another algorithm for 4,2,1 cycle; as is the (7a + 1).

Keywords Equations (1), Magic Number, $O(2^n)$, Exist Algorithms Infinite for 4,2,1

1 Introduction

Everything integer number (3a + 1) have the cycle 4,2,1 as I demonstrate in this article; it is logic pure because (3a) is the smallest odd number that generates another odd numbers and, in turn also generates even numbers. Therefore it is obvious that with a greater or lesser number of operations we reach one of the values of (a) magic that exist in the set of numbers integers.

Conjecture states that, for $\forall(a) \in Z$ we have the cycle 4,2,1 [1] [2]. With the process of the following equations.

$$f(a) = \left\{ \begin{array}{ll} \frac{3a+1}{2} = n & (a = odd) \\ \frac{3a}{2} = n & (a = even) \end{array} \right\}$$

and therefore $f(a); f(f(a); f(f(f(a))) \cdots \Longrightarrow 4, 2, 1$.

2 Main result

It is confirmed that the root (n) in both equations is always $(n = Z)$ and therefore, with greater or less numbers of operations always we have cycle 4,2,1. Whereby the first thing we have to do is define an equation to determine all values of (a) magic, to take us directly to the cycle 4,2,1. The equations are as follows, $(x \geq 1)$

$$[3 \times 4^x + 4^{x-1} + \cdots + 4^{x-(x-1)} + 4^{x-x}] = a$$

(1)

$$[5 \times 4^x + 4^{x-1} + \cdots + 4^{x-(x-1)} + 4^{x-x}] = a$$

The origin of the two is equation is in the equation (4a' + 1)[3]. With it we have a successive chain of values of (a).

$$a' \to a \to a_n \to ....$$

We start with $(a' = (3, 5))$ for have all the values of (a) magic, for the cycles 4,2,1.

That is to day.

$$4[4[4a + 1] + 1] + 1... = (1)$$

Example:

$$\left\{ \begin{array}{c} 4.3 + 1 = 13 \\ 4.13 + 1 = 53 \\ 4.53 + 1 = 213 \\ \ldots\ldots\ldots\ldots \end{array} \right\}$$

$$\left\{ \begin{array}{c} 4 \times 5 + 1 = 21 \\ 4 \times 21 + 1 = 85 \\ 4 \times 85 + 1 = 341 \\ \ldots\ldots\ldots\ldots\ldots \end{array} \right\}$$

Theorem : $\forall(2^b) = X.a + 1$ and $\forall(5.2^{2b+1}) = 3a' + 1$; therefore exist infinite algorithms for the cycle 4,2,1.[6]

Demonstration:

$\exists[X = 2^n - 1$ and $a = 2^n + 1]$

That is to say:

$(2^n - 1)[2^n + 1] + 1 = 2^{2n}$ (2)

$\forall(a)$ **in the algorithms** $(X \geq 7)$**, are defined as follows.**

$$(2^n + 1)^x + (2^n + 1)^{x-1} + ... + (2^n + 1)^{x-x} = a$$

We have demonstrated that Collatz conjecture is not true. And in turn because of some values (a), we have a larger number of operations that with others (simply by the existence of infinite (a) belonging to other algorithms).

And as is obvious, applying the reverse process in the (f(a)), we will have all values of (a) that allow us to reach each of the values of (a magic) belonging to the algorithm (X.a + 1) concerned; it is to say

$$2^n \times m|f^{-1}(a)] = g \to 2^n \times g|f^{-1}(a)] = h \to 2^n \times h|f^{-1}(a)] = (i; ....Z)$$

$$f(f(z)) \cdots\cdots = a(magic) \to 4, 2, 1$$

Finally I point the solution at computer problem (2^n) with the algorithm $(3a+1)$; [8] is to say **define the value** (2^n) **in polinomial time.** To do this we.

$$\forall(2^n : n \geq (3,4)) =$$

$$\left| \begin{array}{l} \frac{3[3\times 4^x + 4^{x-1} + ...+4^{x-x}]+1}{5} = 2^{2x+1} \\ 3[5\times 4^x + 4^{x-1} + ... + 4^{x-x}] + 1 = 2^{2(x+2)} \end{array} \right|$$

3 Conclusion

The algorithm (3a+1) is not the only thing that exists for the cycle 4,2,1. The following cycles are (7a + 1), (15a + 1),.......

We have defined the $O(2^n)$.

It is verified by the (2) the impossibility to have a algorithm (X.a + 1) with infinite descent.

If it has any relevance this article is for quantum physics. Imagine the explosion of a particle, know its ramifications, its size and location.

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