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Proving and Proof of 3n + 1 or Collatz Conjecture: The Traps, an Analysis and a Flowchart and Their ID (Identification)

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Abstract: **The author used steps to show that all number using 3n + 1 conjecture will fall to 4, 2 and eventually 1. And that only one cycle exists. The positive integers may lie to patterns. These could be called traps. A flowchart was used. Each number will have a particular ID dictated by the flowchart.**

Keywords: **Analysis, Collatz conjecture, Conjecture, Flowchart, Identification.**

1. INTRODUCTION

There are many analyses to the collatz conjecture.

Statement of the problem.

Consider the following operation on an arbitrary positive integer:

If the number is even, divide it by two.

If the number is odd, triple it and add one.

The Collatz conjecture is: This process will eventually reach the number 1, regardless of which positive integer is chosen initially. [1]

The trivial 4;2;1 cycle

1 is odd so applying 3n + 1 yields 4 then 4 is even so 4 divided 2 is 2 then 2 is even so 2 divided by 2 is 1. This is a loop by the conjecture. The only known loop.

Steiner (1977) proved that there is no 1-cycle other than the trivial (1;2). [2]

2. ANALYSIS

Traps are used to determine that all numbers will fall to the initial traps. Showing only legal steps for a particular number.

The first traps are

1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048…

Let us call this A.

It is because of the validity of the endless n/2.

The second traps are

(1-1)/3
(2-1)/3
(4-1)/3 = 1 - ok

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(8-1)/3

(16-1)/3 = 5 - ok

(32-1)/3

(64-1)/3 = 21 – ok

(128-1)/3

(256-1)/3 = 85 – ok

(512-1)/3

(1024-1)/3 = 341 - ok

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Let us call this B.

It is because applying 3n+1 part to the set A.

The third traps are

1 x 2 = 2

5 x 2 = 10

21 x 2 = 42

85 x 2 = 170

341 x 2 = 682

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Let us call this C.

It is because applying n/2 part to the set B.

The fourth traps are

(2-1)/3

(10-1)/3 = 3 – ok

(42-1)/3

(170-1)/3

(682-1)/3 = 227 - ok

Let us call this D.

It is because applying 3n+1 part to the set C.

The fifth trap or set is applying n/2 part to the set D.

3 x 2 = 6

227 x 2 = 454

The sixth trap or set is applying 3n+1 part to the set E.

(6-1)/3

(454-1)/3 = 151 - ok

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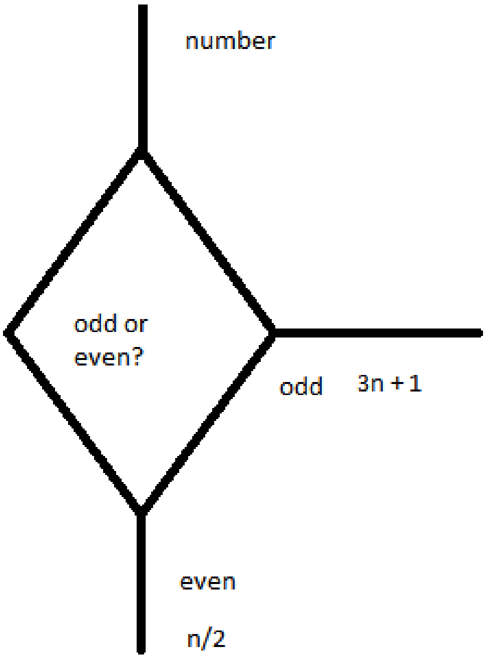
The traps belong to an infinite set.

Traps = AUBUCUD…

The question is in which trap does a number belong. It all started with trap A.

Flowchart



1 = odd 1 (this is a proposed id for 1)

How many odd step/s is there to take?

4 is the lowest possible 3n + 1 result.

2 = even 1 (this is a proposed id for 2)

How many even step/s is there to take?

1 is the lowest possible n/2 result.

They are the mother steps.

Figure 1: (Flowchart for the mother steps)

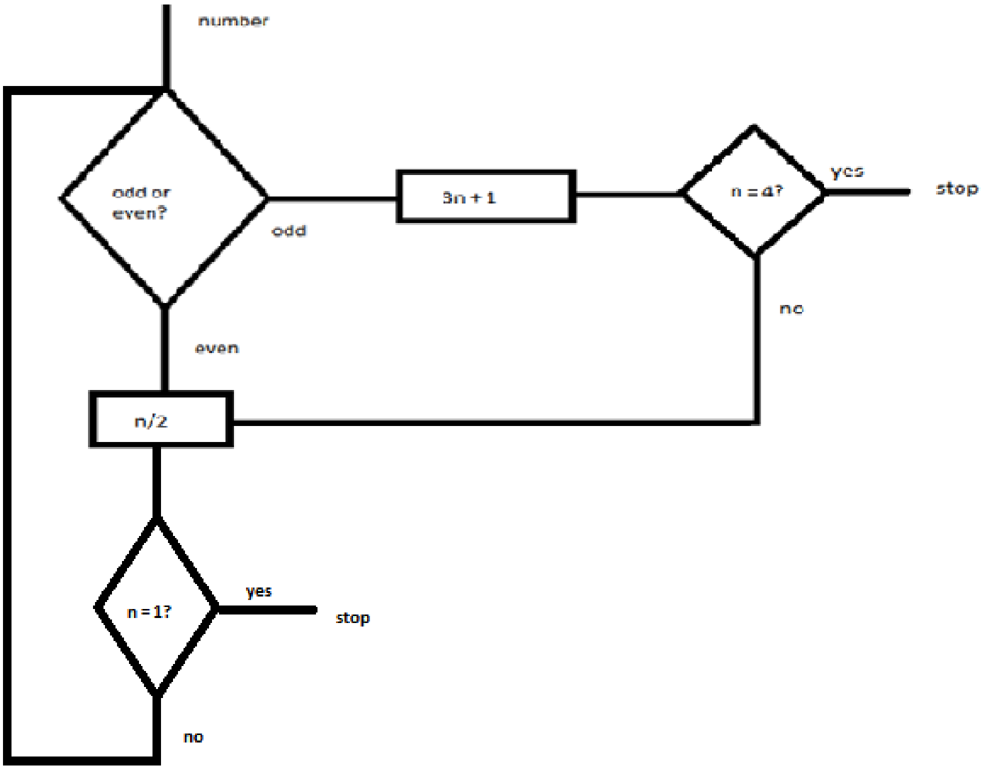


Figure 2: (Flowchart for the conjecture)

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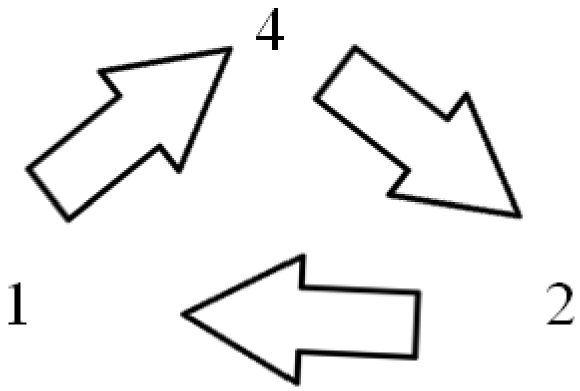

Figure 3: (It is wrong to assume that 4 is not part of the cycle like the title just 3n + 1 conjecture because n/2 plays a big role on this likewise is the number 4, a big part of the solution.)

Breakdown of numbers

So, here are the breakdown of some numbers

4 = even 2

Which is an even step then even 1.

8 = even 3

Which is an even step then even 2.

16 = even 4

Which is an even step then even 3.

These are all part of Trap A.

5 = odd then becomes 16 or odd 2 even 4

21 = odd then become 64 or odd 2 even 6

These are all part of Trap B.

10 = even then becomes 5 or even 1 odd 2 even 4

42 = even then becomes 21 or even 1 odd 2 even 6

These are all part of Trap C.

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3. RESULTS

1. The loop will not stop unless it exits in one of the two situations. Unless the final number be a 4 or a 1.

2. The first step is legality. It should be a positive integer. Then the next step is the recognition if odd or even. Then, a further complex step - formulas to reach 4 or 1.

3. The flowchart shows importance of the decision of odd and even. All will fall to that part.

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4. CONCLUSION

The traps are correct in getting all the numbers. The flowchart is correct in showing the ID of each number and it shows only one cycle. All number will fall to the flowchart.

REFERENCES

[1] O'Connor, J.J.; Robertson, E.F. (2006). "Lothar Collatz". St Andrews University School of Mathematics and Statistics, Scotland.

[2] Steiner, R. P. (1977). "A theorem on the syracuse problem". Proceedings of the 7th Manitoba Conference on Numerical Mathematics. pp. 553–9.