Conjecture Pattern Loop and the initial Number of the Loop and its type

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Abstract—Any conjecture pattern initialises with any non-negative integer lastly terminate with a loop whenever applying the rule→ [when the no. is odd apply (odd*K+1) where K is positive odd integers. and when the no. is even apply (even/2)] and if this will continue with the concern rules, at last the pattern will terminate with a loop. In which the first no. of the loop can be formulate as (K+1) and it is always even in nature.

Index Terms—Collatz Conjecture Pattern, Even, Integers, Loop, Non-negative, Odd.

1 Introduction

In Mathematics there are many patterns, sequences and serieses which we can solve either by any proposition or solve by any formulation techniques. But there have many patterns in Number system in Computational Mathematics that can't be determine by any formulations we have to bear upon some analogy or simply a observation clarify the whole series. If we think of a series that initializes by any non negative integers and proceeding by a formula that when a odd terms came we simply bear a rule (Odd*k+1) and when a even terms came we simply divide it by 2 (even/2) where ∀ k€ positive odd integers (test for 1,3,5 only residual as an assumption because of excessive hurdle in calculation as the corresponding and consecutive odd terms satisfy the condition, it makes sense).And this steps will continue by the concern formulae, and interestingly it terminates with a loop, whose first component can be formulate as (k+1) and stepwise we can find the adjacent components of that loop.Genarally, the terms in the sequence or an series never terminate,it goes infinite but for this case it shows that conclusion.It is similar to the Collatz Conjecture.

2 Theory

2.1 Proposition

If from a set of non-negative integers,

Let, S= {0, 1, 2, 3…} we take any number and go through the following rule.

Let,

a€S, a is the taken number.

When, a€ Z (+ve odd)

Then,

. a*K+1; K€ odd integers

When, a€Z (+ve even)

Then,

a/2;

This will continue and last the pattern is terminate with a loop which is start with (K+1) means the the starting element of the loop is (K+1) and the no. (K+1) should be even in nature.

2.2 Proof

The Proof is not so formally done, but I try to do my best.

If the taken no. is even then it maintains the format like 2n;

And if it odd then maintains (2n-1) like format. If we further divide take 2n it gives n that can be either odd or even. If it is (2n-1) like format then it further multiply by the factor (2n-1) and follow the addition by 1 we know

(2n-1)^2+1 always give the even no. and it can be the 2n as the starting element follow the format (K+1)

K=(2n-1)

Thus, K+1 gives

(2n-1)+1=2n

And if getting the n it is odd further multiply the factor

(2n-1) and add 1 and even then divided by two

. n*(2n-1) give the odd value (as,oddxodd=odd)

+1 give the even value.So, it can be the format of 2n

Which is even and can follow the format like (K+1).which is the initial no. of the loop.

3 Example

Ex. 1)

Let, K=1, a=3; a= {0, 1, 2, 3…}

For odd→(odd)xK+1;

For even→ (even)/2;

(3)x1+1-→(4)/2-→(2)/2-→(1)x1+1-→(2) and the loop goes and see the first element of the loop, it follows the format like (K+1) and gives (1+1)=2.

Ex. 2)

Let, K=3,a=4;

(4)/2-→(2)/2-→(1)x3+1-→4 and the loop goes on and see

- *Arpit Paul is currently pursuing B.Tech degree program in Electronics and Communication Engineering in National Institute of Technology,Sikkim ,India, E-mail: arpippaul.2001@gmail.com* the first element of the loop, it follows the format like (K+1) and gives (3+1)=4.

Ex. 3)

Let, K=5,a=15;
(15)x5+1-→(76)/2-→(38)/2-→(19)x5+1-→(96)/2-→(48)/2-→(24)/2-→(12)/2-→(6)/2-→(3)x5+1-→(16)/2-→(8)/2-→(4)/2-→(2)/2-→(1)x5+1-→6… and the loops go and the first element of the loop again come and that's will go and the element follow the format of (K+1)=(5+1)=6.

4 Collatz conjecture and the extended conjecture of (5x+1) & (x+1)

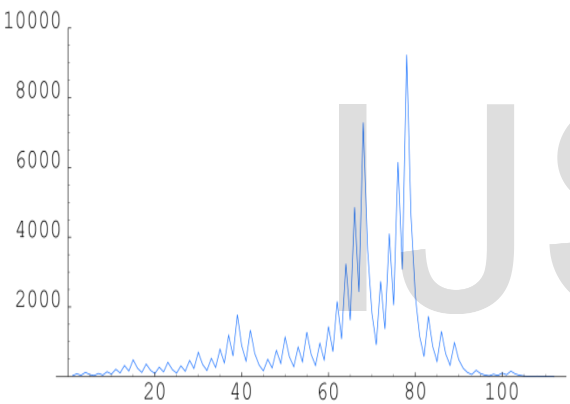

Fig. Conjecture series pattern [1]

Before we only know about the **collatz conjecture** format which follows the format **(3x+1)** for x€(positive odd numbers)

But I try to show the extended format of the conjecture pattern of **(5x+1)** & **(x+1)** which also follow the conjecture pattern

And at last terminate with the loop.

5 Conclusion

So, by the experiment we come to know that for any initial number(positive integers) with which we can start and apply the case for odd and for even and continue this process terminate at a loop in which the 1st element should be in the form of **(K+1)** and should be even. Previously the collatz conjecture loop is already defined that follows the format of **(3x+1)** for the odd and now I just extended and show that the pattern for **(5x+1)** and **(x+1)** which will also be followed by the odd numbers just like the collatz conjecture pattern and terminate at last in the loop.

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References

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