Mukhtar – collatz rule

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Abstract

In this paper , there is only one conjecture which is already famous and prepared by Lothar collatz (German Mathematician). But the most important thing is that there was no proof or disproof of this collatz problem (3x+1).This conjecture was given by Lothar collatz in 1937 and nobody has proved yet. And today I have proved that this is true for any odd natural number.

Keywords:- Lothar collatz conjecture

Introduction

The collatz conjecture is an unsolved problem in mathematics as it has been for more than 60 years. It is named after Lothar collatz in 1973. The conjecture also known as Syracuse conjecture or problem. Although the problem on which the conjecture is built is remarkably simple to explain and understand the nature of the conjecture makes proving or disproving the conjecture exceedingly difficult. In this paper I present the proof of the collatz conjecture for any odd natural number.

Collatz conjecture

Collatz says, choose any natural number. If number is even then divide it by two otherwise multiply it by three and add one you would continue until you reach one.

Proof

If we take any even natural number and after dividing by two it will become odd. So I decide that I will take only odd numbers and then apply collatz rule and we will get final proof that this true for any odd natural number.

Take first n odd natural number 1,3,5,7,9,…….n. and apply collatz rule.

1.For number 1

Multiply it by three and add one

3×1 +1 = 4

Now divide it by 2 because it is even

4/2 = 2

Again divide it by 2 because it is even

2/2 = 1

Now we can explain this as

3×1+1 -> 4->2->1

Now it has reached to one.

2. For number 3

Multiply it by 3 and add one

3×3+1 =10

Now divide it by two because it is even

10/2 =5

Multiply it by 3 and add one because it is odd

5×3+1 = 16

Divide it by 2 because it is even

16/2 = 8

Again divide it by 2 because it is even

8/2 = 4

Again divide it by 2 because it is even

4/2 = 2

2/2 = 1

Now we can explain this as

3×3+1-> 10 -> 5 -> 16-> 8 -> 4 -> 2 -> 1

[In this last three steps are same as in point (serial number) 1. So I write it as 2→ 1 it means last steps of point 2 are same as in 1.]

Now it has reached to one

3. For number 5

Similarly Apply collatz rule ,we will get

5×3+1->16 -> 8 -> 4 -> 2 -> 1

4. For number 7

Multiply it by 3 and add one

3×7+1 = [(7+0)3+1]

Now , put the value of (7) =1

[Because, if we take odd number 7 and follow collatz rule then we will also reach to 1.

First multiply it by 3 and add one .

7 -> 22 -> 11 -> 34 -> 17 -> 52 -> 26 -> 13 -> 40 -> 20 -> 10 -> 5 -> 16 -> 8 -> 4 -> 2 -> 1.

Now we can easily see that the last three steps are ends with 4, 2, 1.]

If we replace (7) with 1. Then see what will come in last 2-3 steps after applying collatz rule.

3×7+1 = [(7+0)3+1] now replace (7) with 1 . we will get

(1+0)3+1 -> 4-> 2-> 1

So, I think there is no fault in replacing (3×2+1) with 1.

Because it is also ending with 4, 2, 1.

5. For number 9.

Apply collatz rule , we will get

9×3+1 = [(7)+2]3+1 -> (1+2)3+1 [replace (7) with1] -> 10 and the remaining steps are same as in point (serial number) 2 . Because ten is also coming in point 2.

5→ 2→1 it means the steps of point 5 are completing with the help of point 2 and the steps of point 2 are completing with the help of point 1.

6. For number 11.

Apply collatz rule and replace (7) with 1. We will get

11×3+1 = (7+4)3+1 -> (1+4)3+1 -> remaining steps are same as in point (serial number) 3. Because 16 is also coming in point 3.

6→3→2→1 it means the steps of point 6 are completing with the help of point 3 and the steps of point 3 are completing with the help of point 2 and the steps of point 2 are completing with the help of point 1.

7. For number 13.

Apply collatz rule and replace the number 7 with 1. We will get

13×3+1 = (7+6)3+1 -> (1+6)3+1 -> remaining steps are same as in point 4. Because 22 is also coming in point 4.

7→4→3→2→1 it means the steps of point 7 are completing with the help of point 4 and the steps of point 4 are completing with the help of point 3 and the steps of point 3 are completing with the help of point 2 and the steps of point 2 are completing with the help of point 1.

8. For number 15.

Apply collatz rule and replace the number 7 with 1.

15×3+1 = (7+8)3+1 -> (1+8)3+1 -> remaining steps are same as in point 5 . Because 28 is also coming in point 5.

8→5→4→3→2→1 it means the steps of point 8 are completing with the help of point 5 and the steps of point 5 are completing with the help of point 4 and the steps of point 4 are completing with the help of point 3 and the steps of point 3 are completing with the help of point 2 and the steps of point 2 are completing with the help of point 1.

9. For number 17.

Apply collatz rule and replace the number 7 with 1.

17×3+1 = (7+10)3+1 -> (1+10)3+1 -> remaining steps are same as in point 6. Because 34 is also coming in point 6.

9→6→5→4→3→2→1 it means the steps of point 9 are completing with the help of point 6 and the steps of point 6 are completing with the help of point 5 and the steps of point 5 are completing with the help of point 4 and the steps of point 4 are completing with the help of point 3 and the steps of point 3 are completing with the help of point 2 and the steps of point 2 are completing with the help of point 1.

10. For number 19.

Apply collatz rule and replace the number 7 with 1.

19×3+1 = (7+12)3+1 -> (1+12)3+1 -> remaining steps are same as in point 7. Because 40 is also coming in point 7

10→7→6→5→4→3→2→1 it means the steps of point 10 are completing with the help of point 7 and the steps of point 7 are completing with the help of point 6 and the steps of point 6 are completing with the help of point 5 and the steps of point 5 are completing with the help of point 4 and the steps of point 4 are completing with the help of point 3 and the steps of point 3 are completing with the help of point 2 and the steps of point 2 are completing with the help of point 1.

11. For number 21.

Apply collatz rule and replace the number 7 with 1.

21×3+1 = (7+14)3+1 -> (1+14)3+1 -> remaining steps are same as in point 8. Because 46 is also coming in point 8.

11→8→7→6→5→4→3→2→1 it means the steps of point 11 are completing with the help of point 8 and the steps of point 8 are completing with the help of point 7 and the steps of point 7 are completing with the help of point 6 and the steps of point 6 are completing with the help of point 5 and the steps of point 5 are completing with the help of point 4 and the steps of point 4 are completing with the help of point 3 and the steps of point 3 are completing with the help me point 2 and the steps of point 2 are completing with the help of point 1.

12. For number 23.

Apply collatz rule and replace the number 7 with 1.

23×3+1 = (7+16)3+1 -> (1+16)3+1 -> remaining steps are same as in point 9. Because 52 is also coming in point 9.

12→9→8→7→6→5→4→3→2→1 it means the steps of point 12 are completing with the help of point 9 and the steps of point 9 are completing with the help of point 8 and the steps of point 8 are completing with the help of point 7 and the steps of point 7 are completing with the help of point 6 and the steps of point 6 are completing with the help of point 5 and the steps of point 5 are completing with the help of point 4 and the steps of point 4 are completing with the help of point 3 and the steps of point 3 are completing with the help of point 2 and the steps of point 2 are completing with the help of point 1.

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x. Similarly, For number ‘n’ .

[where x is the last point (serial number)]

When we will apply collatz rule and replace the number 7 with 1 we will get.

n×3+1 = (7+n-7)3+1 -> (1+n-7)3+1 -> and the remaining steps will also same as in point (x-3). Because (1+n-7)3+1 will also present in point (x-3).

x→(x-3)→(x-4)→(x-5)→(x-6)…….→3→2→1.

It means the steps of point x are completing with the help of point (x-3) and the steps of point (x-3) are completing with the help of point (x-4) and the steps of point (x-4) are completing with the help of point (x-5) and the steps of point (x-5) are completing with the help of point (x-6) and so on . This process will be going on. This is the pattern which I have explained in previous points.

Now, see the last point the pattern is ending with

→3 →2→1. It means any odd natural number as I have taken (n) in last point (x) reach to 1 with the help of point 1.because this pattern is ending with 1.(……..-> 3->2->1).

Now, this pattern is [(x)→(x-3)→(x-4)→(x-5)→(x-6)……→3→2→1] my final proof for any odd natural number (n)

Conclusion.

The discussion of Lothar collatz conjecture (3x+1) is named as " Mukhtar-collatz conjecture " because I have proved that any odd natural number also reach to one after applying collatz rule so I put its name Mukhtar -collatz conjecture. In this I have also explained step by step and it is very easy for everyone to understand it. Moreover, construction method of proof is expressed. There are many ideas for research in this field such as in this proof how the different numbers are ending with same numbers in pattern (……..4→3→2→1).

References.

1.Lothar collatz conjecture (3x+1) , German Mathematician.