PROOF OF THE LEMMA

ABOUT THE ABSENCE OF NONTRIVIAL CYCLES

COLLATZ SEQUENCES

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Abstract: the article provides an outline of the proof of the absence of nontrivial cycles in the Collatz sequence.

The described lemma about the absence of nontrivial sequence cycles is an independent part of the proof of the Collatz conjecture

***1.** The concepts used.*

***1.1** The numbers a,b,c... are an interconnected series of odd numbers of a continuous Collatz sequence in the positive range of the natural series.*

***1.2** The numbers A,B,C ... are a transformation of the numbers of the Collatz sequence, respectively, which are also an interconnected series of odd numbers (hereinafter referred to as "series X"). Transformation of the form A=3a and so on.*

***1.3** The numbers A` D'C'... are a transformation of the numbers of the X series (3n-1), making up an interconnected series of even numbers (hereinafter referred to as the "Y series"). The transformation of the form is performed by A-1=A` and so on.*

***1.4** A series {2/3} is a set of numbers such that the ratio of even and odd numbers is $\frac{2^h}{3^m}$, (where, h,m are integers).The symbol ≡ indicates that the numbers belong to a series.*

***2.** Proof.*

***2.1** The presence of a nontrivial cycle in the Collatz sequence corresponds to 1.1. Accordingly, the series X must correspond to 1.2*

$$\frac{(3a+1)(3b+1)(3c+1)}{abc} = 2^h \quad (1.1) \qquad \frac{(A+1)(B+1)(C+1)}{ABC} = \frac{2^h}{3^m} \equiv \{2/3\} \quad (1.2)$$

2.2 *The series X cannot be transformed into the series Y while preserving the integer ratio (2), therefore, for example, no sections of these series can simultaneously belong to the series {2/3}, all parts of which are connected by a common integer ratio* $\frac{2^h}{3^m}$ *,that is, cycles in the series X and Y are mutually excluded.*

$$\left\{\frac{2}{3}\right\} \equiv \frac{(A`+1)(B`+1)(C`+1)}{A`B`C`} \neq \frac{ABC}{(A+1)(B+1)(C+1)} \qquad (2)$$

2.3 *It is known that the Collatz sequence in the negative range, that is, the sequence (3n-1), has nontrivial cycles. Accordingly (3), nontrivial cycles can have a series Y, which excludes nontrivial cycles in the series X.*

$$\frac{(A`+1)(B`+1)(C`+1)}{A`B`C`} = \frac{ABC}{(A-1)(B-1)(C-1)} \equiv \{2/3\} \qquad (3)$$