Affirmative Resolve of Collatz's Problem

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In this article, we prove Collatz's Problem.
Collatz's Problem

$$\begin{cases} n \textit{ is even} & \Rightarrow \textit{devide } 2 \\ n \textit{ is odd} & \Rightarrow \textit{times } 3 \textit{ and plus } 1 \end{cases}$$

Repeat this, sequence goes to 1.

Next result is contained in our proof.

theorem 1.1. *(Half proof of Collatz's problem) Except trivial case, Collatz's sequence do not take same value.*

theorem 1.2. *Collatz's Problem is true.*

Proof. For example, the sequence start from $4n + 1$.

$$4n + 1 \to 12n + 4 \to 3n + 1$$

If n is even (0 is contained)

$$6n_2 + 1 \to 18n_2 + 4 \to 9n_2 + 2$$

n_2 is odd case,

$$18n_3 + 11 \to 54n_3 + 34 \to 27n_3 + 34$$

finally n_3 is even,

$$54n_4 + 34 \to 27n_4 + 17 \to 27n_4 + 17$$

The case, final term is 17,

$$9 \to 28 \to 7 \to 22 \to 11 \to 34 \to 17$$

We get $n = 2$, generally, if sequence is long, first term is big. We consider 17 is already big enough. If ssequence is long and do not go 1, first term is taken as infinity.First term is finite. All sequence goes to 1. Collatz's Problem is true. □