

Collatz Conjecture

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Conjectures:

- 1) For any integer n , the number of terms it takes to get to 1 increases by 1 when n is multiplied by 2.
- 2) For an integer n , the number of terms it takes 2^n to reach 1 is $n + 1$.
- 3) For any odd integer n in the Collatz sequence, the next term is always even

Proof. Let $a_i = 2k + 1$ be an odd integer. We want to show that the next term of the Collatz Conjecture will always be even. Since a_i is odd, to find the next term we must plug a_i into $a_i + 1 = 3a_i + 1$. This gives us:

$$\begin{aligned} a_i + 1 &= 3(2k + 1) + 1 \\ &= 6k + 3 + 1 \\ &= 6k + 4 \end{aligned}$$

Which is even. Therefore, for any odd integer a_i , the $a_i + 1$ term will always be even

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