Collatz Conjecture Gransbury

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Problem 1. Any number that is 4 raised to some power, will have an odd amount of terms to reach 1.

Problem 2. The amount of terms it takes a number 2^n to reach 1 is equal to $n + 1$.

Problem 3. Any number that is 2 raised to some power, will always converge.

Proof. Let x be some number such that $x = 2^n$, where $n > 0$. By the definition of prime factorization, $x = \{2_0, 2_{(n-2)}, 2_{(n-1)}, ..., 2_n\}$, which indicates no matter the value of n, there will be at least one 2 in the prime factorization of x. Since there will be at least one 2, x will always be even until the terms in the Collatz sequence for x reaches one. Therefore, any number that is 2 raised to some power will always converge to 1. $\square$