

PROBLEM N.1A - COLLATZ CONJECTURE

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March 18, 2019

1. If x takes n terms to reach 1, then $2x$ takes $n + 1$ terms to reach 1.

Proof. Let x be a positive integer greater than 0 that takes n terms to reach 1. $2x$ will always be an even number no matter if x is even or odd. Since $2x$ is even, we must divide it by two to find the next term in the sequence. This would be x . The rest of the terms follow and reach 1 after n terms. Therefore, $2x$ takes $n + 1$ terms to reach 1. \square

2. 2^n takes $n + 1$ terms to reach 1.
3. When graphing the sequences, it eventually follows exponential decay.