

Chapter 1

collatz conjecture

Form a sequence by beginning with an integer n and repeatedly applying the function $f(n)$, taking the result of each step as the input of the next.

$$f(n) := \begin{cases} n/2 & \text{if } n \bmod 2 = 0 \\ 3n + 1 & \text{otherwise} \end{cases}$$

The collatz conjecture states that for any natural number n this sequence will reach the loop 1, 4, 2, 1. My goal is to prove that no other loop exists, meaning that this sequence must either diverge to infinity or reach 1.

1.0.1 base 3

A number in base the can be defined as

$$\sum_{n=0}^{\infty} 3^n a_n$$

It is even if $\sum_{n=0}^{\infty} a_n$ is even.