

MATH 242 — 3 October 2025

Collatz Function: $Col(n) = \begin{cases} 3n+1 & \text{if } n \text{ odd} \\ \frac{n}{2} & \text{if } n \text{ even} \end{cases}$

Examples: $Col(5) = 16$, $Col(100) = 50$, $Col(31) = 94$

Iterate $Col(n)$:

$$5 \rightarrow Col(5) = 16 \rightarrow Col(16) = 8 \rightarrow Col(8) = 4$$

$$\rightarrow Col(4) = 2 \rightarrow Col(2) = 1 \rightarrow Col(1) = 4$$

What do you observe?
What do you wonder?

Collatz Conjecture: For any positive integer starting value, the sequence of Collatz iterates eventually reaches 1.

This has been computationally verified for all starting values up to about 10^{20} .

A good mathematical question satisfies four characteristics:

- 1. The question is interesting to you.**
- 2. You don't already know the answer to the question.**
- 3. You haven't already seen the question before, or at least not exactly.**
- 4. You can begin to make computational investigations to shed light on the question.**