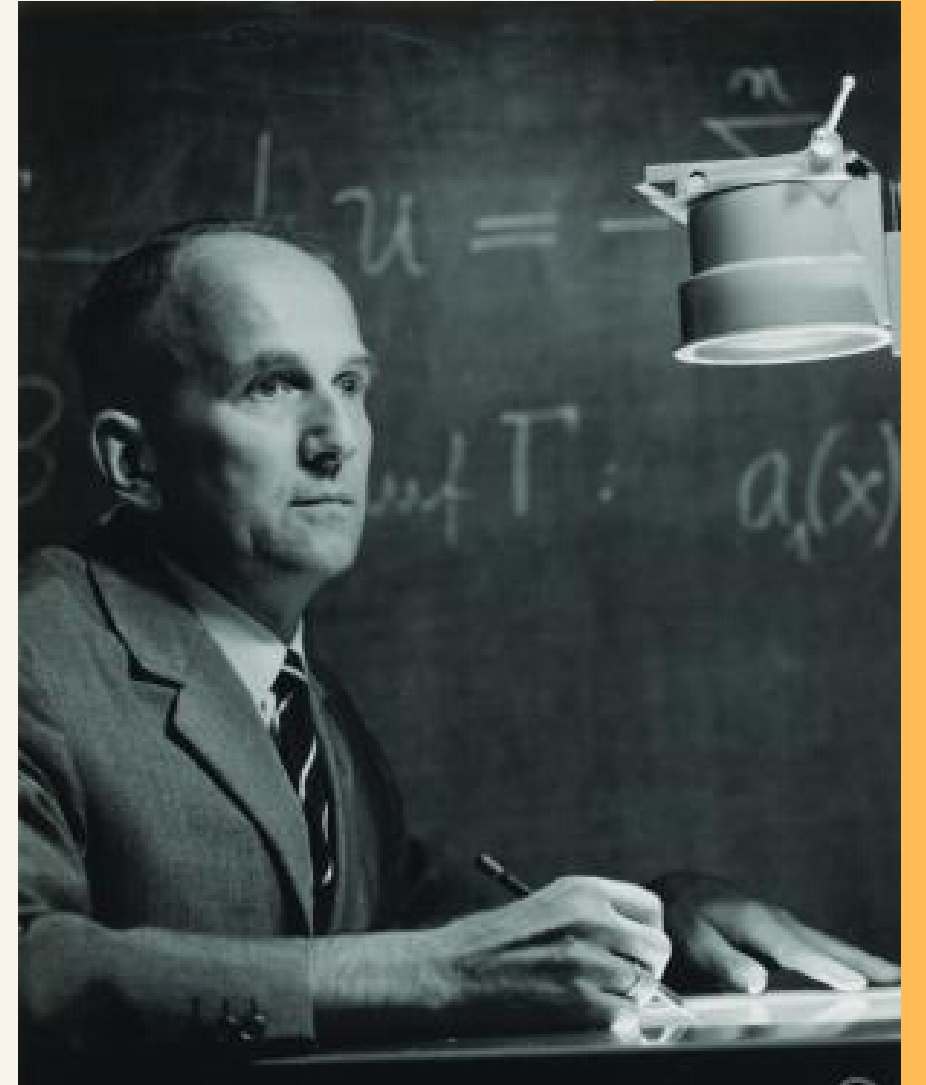




The $3X + 1$ PRoblem !



The Collatz
sequence in
Python

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Project Euler

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Longest Collatz sequence

Problem 14

The following iterative sequence is defined for the set of positive integers:

$n \rightarrow n/2$ (n is even)

$n \rightarrow 3n + 1$ (n is odd)

Using the rule above and starting with 13, we generate the following sequence:

$13 \rightarrow 40 \rightarrow 20 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$

It can be seen that this sequence (starting at 13 and finishing at 1) contains 10 terms. Although it has not been proved yet (Collatz Problem), it is thought that all starting numbers finish at 1.

Which starting number, under one million, produces the longest chain?

NOTE: Once the chain starts the terms are allowed to go above one million.



So, what is Collatz Sequence?

If n even, Then $n \rightarrow n/2$

If n odd, Then $n \rightarrow 3n + 1$

The Collatz Conjecture states that if you pick a number, and if it's even divide it by two and if it's odd multiply it by three and add one, and you repeat this procedure long enough, eventually your friends will stop calling to see if you want to hang out.



Example?
Take a
look→

Let us say you chose number 6, then
by applying the sequence, the
algorithm should work this way :
 $6 \rightarrow 3 \rightarrow 10 \rightarrow 5 \rightarrow 16 \rightarrow 8 \rightarrow 4 \rightarrow 2 \rightarrow 1$

Did you follow the pattern? each even
number was divided by 2 , else (if odd)
it was multiplied by 3 then + 1 and it
should be iterated until we reached 1
then the algorithm should stop.



LET'S DO IT IN
Python!

