

Matemática Discreta

Exercícios computacionais – Conjunto 1

Os problemas a seguir foram retirados do site Project Euler, que armazena uma série de desafios matemáticos e computacionais interessantes: <https://projecteuler.net/archives>

PROBLEM 7: 10 001st prime number

By listing the first six prime numbers: 2, 3, 5, 7, 11, and 13, we can see that the 6th prime is 13. What is the 10 001st prime number?

PROBLEM 9: Special Pythagorean triplet

A Pythagorean triplet is a set of three natural numbers, $a < b < c$, for which,

$$a^2 + b^2 = c^2$$

For example, $3^2 + 4^2 = 9 + 16 = 25 = 5^2$.

There exists exactly one Pythagorean triplet for which $a + b + c = 1000$. Find the product abc .

PROBLEM 14: Longest Collatz sequence

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.

OBS: A resposta final dos problemas pode ser conferida em

<https://github.com/nayuki/Project-Euler-solutions/blob/master/Answers.txt>