PROOF OF COLLATZ CONJECTURE.

Niceto Valcárcel Yeste. Graduate in C.C, Physical.

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1. Introduction.

The Collatz conjecture states that, given any natural number n $\in N$, we wil always reach the number 1 by applaying the following function f to n as many time as necessary.

If f(n) is even, divide n by 2, and if f(n) is odd, multiply n by 3 and add 1.

The method used is the method of proof by contradiction.

It is assumed that there exists a FIRST number n that doesnt satisfy the Conjecture and it is proven that it cannot be.

2. Demonstration.

.Let $n \in N$ the first natural number that does not satisfy the Conjeture.

The number n can not be an even number beaucase $\frac{n}{2} < n$ satisfy the Conjeture.

Let n an odd number.

Then $n = 4q \pm 1$

$n = 4q + 1 \Rightarrow 3\,(4q + 1) + 1 = 12q + 4 \Rightarrow 3q + 1 < n$

$n = 4q-1 = 2^2q-1 \Rightarrow 3\left(2^2q - 1\right)+1 = 12q-2$ is an even number $\Longrightarrow 6q-1$ an odd number

$3\,(6q - 1)+1$ is an even number.$3\,(6q - 1)+1 = 18q-2 \Rightarrow 2m \Rightarrow m = 3^2q-1$

Let $m = 2t - 1 = 9q - 1 \Rightarrow q = \frac{2t}{3^2} = \frac{2(2a+1)}{3^2} \Rightarrow (2a + 1) = 3^2\,(2b + 1)$

$4q - 1 = 4 * 2\,(2b + 1) - 1$ is an odd number$\Rightarrow 3\,(4 * 2\,(2b + 1) - 1) + 1 = 3 * 4\,(2b + 1) - 1$ is an odd number$\Rightarrow$

$\Rightarrow 3\,((3 * 4\,(2b + 1)) - 1) + 1 = \left(3^2 * 2\,(2b + 1)\right) - 1$ is an odd number$\Rightarrow$ $3\left(\left(3^2 * 2\,(2b + 1)\right) - 1\right) + 1 \Rightarrow \left(3^3\,(2b + 1)\right) - 1 = 2^ic \Rightarrow$ is an even number

$c = \frac{\left(3^3(2b+1)\right)-1}{2^i} < n$

Let $m = 2^k\,(2p - 1)$$\Rightarrow (2p - 1) < n$

$(q, m, a, b, c, i, k, p) \in N$

Therefore n satisfy the Conjecture.

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3. My email.

nicetovalcarcel@gmail.com