PROOF OF THE MERSENNE PRIME CONJECTURE

October 28,2024

1 Ahutor. Niceto Valcárcel Yeste. Graduate in Physical Scienices-

2 Introduction.

The purpse of this article is to prove whether or not there are an infinite prime of Mersenne prime numbers.

A Mersene prime number is a is a prime number of the form $(2^t - 1)$, where t is a prime number such that 2 to de power of t minus 1 is prime number.

The method used is the method of reduction to absurdity. It will be proposed that there exists a final Mersenne prime number $\left(2^{2m+1} - 1\right)$ and a contradiction will be reached, there for it is concluded tha there are infinite Mersenne prime numbers.

3 Demonstration.

Le $2^{2m+1} - 1$ the lat Mersenne prime number, where $(2m + 1)$ must be a prime númber.

Let, for all $(n > 0)$ the number $\left(2^{2(m+n)+1} - 1\right) = 2^{2m+1+2n} - 1$ is a composite numberl because if $(2(m + n) + 1)$ is a composite or prime number, $\left(2^{2(m+n)+1} - 1\right)$ is a composite number

$2^{2m+1+2n} - 1 = 1 + 2 + 2^2 + 2^3 + 2^4 + \ldots\ldots\ldots\ldots + 2^{2(m+n)-1} + 2^{2(m+n)} = 3 + 3\left(2^2\right) + 3\left(2^4\right) + 3\left(2^6\right) + \ldots. + 3\left(2^{2(m+n-1)}\right) + 2^{2(m+n)} = 3\left(1 + 2^2 + 2^4 + 2^6 + \ldots. + 2^{2(m+n-1)}\right) + 2^{2(m+n)=}$

$= 3\left(1 + 2^2 + 2^4 + 2^6 + 2^8 + 2^{10} + \ldots\ldots\ldots\ldots + 2^{2(m+n-2)} +\right) + 2^{2(m+n)} = 3\left(5 + 5\left(2^4\right) + 5\left(2^8\right) + 5\left(2^{12}\right)\right.$
$2^{2(m+n)} = (3)(5)\left(1 + 2^4 + 2^8 + 2^{12} + 2^{16} + 2^{20} + \ldots\ldots\right) + 2^{2(m+n)} =$

$= (3)(5)(17)\left(1 + 2^8 + 2^{16} + 2^{24} + 2^{32} + 2^{40} + 2^{48} + \ldots\ldots\ldots\right) + 2^{2(m+n)} = (3)(5)(17)(257)\left(1 + 2^{16} + 2^{32} + \ldots\ldots\ldots\right) + 2^{2(m+n)} = (3)(5)(17)(257)(65537)\left(1 + 2^{64} + 2^{128} + \ldots\ldots\right) + 2^{2(m+n)}$

Since $\left(2^{2(m+n)+1} - 1\right)$ is an infinite numbers of composite numbers, there will be at least one tlhat is a multiple of $(3, 5, 17, 257, 641, 65537, 6700417\ldots\ldots\ldots\ldots)$, but there is none

Therefore $\left(2^{2m+1} - 1\right)$ is not the last Mersenne number.

4 My e-mail-

-

nicetovalcarcel@gmail.com