Research & Development in Mathematics

A PROPERTY OF DICHOTOMY OF NUMBER 2

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INTRODUCTION

In the systematic study of prime numbers –the elementary blocks or “atoms” of all the mathematical science- you notice and can reveal some fundamentals relations and profound links within different branches of the pure and applied mathematics itself. A quite common phenomenon in branches as: analytic number theory, algebraic geometry, p-adic numbers, algebraic number theory, etc.

BACKGROUND

In traditional mathematics, it is accepted by convention that number 1 is not considered as a prime. Number 2 is the first and unique even prime of all the ordinary and absolute primes' set. So, this number has a different situation regarding the sequence of primes.

Perhaps there is a formula, even many, which generates all the primes. It is yet an open study subject matter. On this respect, for example, the Russian mathematician Yuri V. Matyasevich at the time of proving the inexistence of a universal algorithm which would allow to find out if an algebraic equation has or has not integer solutions, in 1969 constructed a polynomial of 24 variables and degree 27 whose positive values, when the variables run through the set of positive or negative integers- which are precisely the prime numbers- the variables have to take so astronomical values, that he could only generate the first prime number, 2.

By the way, we have been able to generate the prime number 2, and the subsequents 3, 5, 7 and all the rest in rigorous mathematical order, based on a creative new way nevertheless much more simple. For the present research, this particular number 2 is endowed with properties which are normally formulated in abstract and rigorous terms. We found applying an imaginative method that one of these important properties is the one that emerges of the mathematical logic itself, known as the property of dichotomy. It is easy to see that when we apply this property to the set N of natural integers, it divides or partition the concept and the body, in other two concepts and bodies of **even** numbers on one side, and **odd** numbers on the other hand, which exhausts all the extension up to the infinite. So, in relation to the study of the primes we are allowed now to formulate a quite nice theorem:

THEOREM

"Every prime number is equal to 2 or is equal to a multiple of 2 augmented or diminished in one unit"

Let P be equal to 2 or a product of 2 augmented or diminished in one unit, we will demonstrate that P = 2n + - 1, where n is a natural number.

Demonstration

If 2 is the first prime number, the first part of the theorem is demonstrated. If 2n is necessarily even, for all n and so, always divisible by 2, if we add or subtract 1 to the product 2n, it is impossible, in all cases, to divide the result by 2, by hypothesis, since an odd number is not divisible by 2. Consequently it is demonstrated the second part of the theorem, and in general of the whole theorem, as required. Q.E.D.

Examples

11 = 2x5 + 1 109 = 2x55 – 1

DISCUSSION

The proof or demonstration of the theorem let us face, in a certain manner more creatively and ordered way the systematic study of the succession, structure, and distribution of the elusive prime numbers, as we will see in subsequent research articles about the properties and typological characteristics of the prime numbers (ie. See the next scientific article on "A property of trichotomy of number 3")

CONCLUSION

In the methodology used the algebraic rules of operation of addition, multiplication, and subtraction are applied and fulfilled rigorously. The property of dichotomy of the prime number 2 as well as the relation of partition thus created let us divide the numerical set with "economy" in the study in at least 50 per cent of the numbers (all the even numbers in the set, except number 2 are put aside) and an advance in the millennium search to "decode the secrets of the Law of the Prime Numbers" in Number Theory.

Acknowledgments

To the bolivian mathematician Magin Zubieta V. for useful discussions and opinions on various omissions in our paper.

We thank Roberto Zambrana, Technical Manager, and Lic. Sergio Alvarez of the UMSATIC Program and Lic. Alfredo Rojas Osinaga and Eng. Jhonny Paco for the diffusion of this research paper.

Bibliography

[Agu01] R. Aguilar-Achá . Decoding the Secrets of the Law of Prime Numbers. http://www.bolivialinux.org

[Apo90] T. M. Apostol. Introduction to Analytic Number Theory. Reverte S.A. NY. 1990

[CN89] H. Cohen & D. Nordon. The Arithmetic assisted by the Geometry and the Computer. Scientific

World. Paris, 1989.

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LP. 1/XII/03.

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