

Research and Development in Mathematics



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THE AGUILAR-ACHA PRIME NUMBERS

INTRODUCTION

By definition an ordinary prime number is a positive integer that cannot be expressed as a product of two or more smaller factors. Its only divisors are 1 and itself. The set or succession of primes is infinite and apparently does not follow any role, order or simple law. So the enigma and problem is such that the model, density, structure and distribution of the absolute prime numbers continue to be extremely complicated, as well as the factorisation problem and the so called Riemann's hypothesis. Those are the great problems and challenges in number theory; still open to the study and research throughout the world.

BACKGROUND

Historically, a legion of professional and amateur mathematicians had put their best efforts to unveil intuitively or formally any method to solve these and other problems, within the framework of the decimal or ordinary system of numeration. Thousands of conjectures, hypotheses and theorems have been formulated, beginning with the most simple and incredible, up to the most complicated and even curious. Many have been proved, but the great majority not yet. They are in that respect known as the Fermat's primes, the Mersenne's primes, the Sophie Germain's primes, the Factorial primes, the Twin primes, etc. We have also asked ourselves, How do you find the giant primes?, what is the formula?, Is there any efficient algorithm? How many primes are there up to any $n \in \mathbb{N}$? How do you identify methodically, systematically and mathematically the primes of pseudo-primes? Which are the roles and operators for those and other goals? How can you partition them for an efficient grid processing?

THE AGUILAR-ACHA'S PRIME NUMBERS

Our creative and unpublished research about the primes is based on the study and investigation of the inner properties and relations of the numbers themselves. So, that applying the deductive inductive method and the systematic and abstract reasoning of the mathematical logic, we could discover and prove a set of theorems, departing from 2,3,5, 7, ...n... ∞ , which let us close a finished, logic and structured theory about the prime numbers. Following that innovative idea we have to generate what we call the Aguilar - Acha's prime numbers. A special class of absolute primes endowed with some characteristic and unique properties, which allow us to formalize the generation of all the primes in a strict and logical manner.

So, avoiding to give technical details, such as formulas and algorithms in this scientific article whose purpose is most of all to divulge the discovery following a remarkable and fully proved

pattern we define as Aguilar Acha's primes, (ζ Aguilar Acha's pseudoprimes?) for example the five following absolute prime numbers:

- a) 83206188165605210378137
- b) 1265387069261248073095693911931899040830517
- c) 44619154012697354916874972804312121957361090119
- d) 450094620862682215953169056804394023557088230914503061621591
- e) 51887711213803354677207493948038953621564859177886491154411636348879189189752059388157
- f) 55258396954645311201303802735233011443775848174791602706756357221469136208017678018537
24599722008379503935030673596961
- g) 12631855271974763766014762391931165315340616789985950504573100701508179434833834506490
56736088894387159830628853856984823048678494977827531984433414007724685048764627198804
23217636990756716352258790755189082669228490128194881646186775811709865934885290861311
71
- h) 18481401679431183493463074635310948111614108150080607991616342671121104921110793364064
28050406940594411474056093076827834106111321336711273506107136804391582051212606406278
37240610441661388127708162826241360887081150412068372181380618608108643613804081093388
07949305061206767856405069394803487808194083735107208121063627806108097911940836730782
93828028543083722107806138137793606177339442077937808769180610837081208111076143112138
7878372388350648781206194794308351169509151087019238811231678116899187
- i) 1246478061171112107435108374350822201394671270621298050945337351107788162858479
1673616921337511940867461868880692515883710412827517358806546528124534728255840
7887189255376270716584844717445413535544881810736282553634807181872081019191920
9918080808188188107210108929191082897989080808911191833718355128891825537313
6928082712827370691717189389119191163610617080858192883691691717293552826537189
7452820191827907071718102919191082807171881717291919181090977207119287571717171
7272871729281270451162645137161346152626404535873883712726471626263658728173863
6273555562626116363715372893065545543593642926494717346307846412718103926448816
5046264471827098305584071825628188340717356281883554528261428173552819725638918
3018216347192874455372554585068626404371908912821634444292195872826461626543793
9882890909065453672537105148684628891405462776441770444413890919841126586453830
6121437125128115372105121049406559317875871851099385238686869587813859658365818
5484549510437136614447195652515856873628252173678377

CONCLUSION

It is an extraordinary and outstanding discovery of $\mathbb{P} \subset \mathbb{N}$. With it, it has been unveiled an important set of mathematical relations that rule the Law of the Primes, based on our formulated and proved theorems, which have been rigorously proved by other national and international mathematicians.

APPLICATIONS

It has been said that they are surprising discoveries, which perhaps have been neglected by other mathematicians, because they are no other thing than numerical and recurrent patterns of new

order and style, from which we extract a kind of recipes or new operational algorithms in acceptable and competitive timing; which can be programmed more efficiently via supercomputers. With that in mind - since the required numbers are quite long - you end up requiring the most potent tools and batteries of processing power, to generate the prime numbers as big as-desired, including those that are truly world records of different types for a variety of industrial, technical and technological uses, as well as for theoretical and applied scientific ends.

FUTURE VISION

It is necessary to fully generalize this theory discovering and proving some other theorems unifying in the process the theory of numbers with the algebraic theory of numbers, the analytic theory of numbers and the algebraic geometry, which will be undoubtedly a landmark in the advancement of its ruling law, and maybe the solution of important problems as the so called strong and weak Goldbach' s Conjectures, or the Riemann' s Hypothesis, the most important of the contemporary mathematical problems.

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First 990 prime numbers ([36 Kb](#) ) ([10 Kb](#) )

