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New Solutions to Solve Two Conjectures

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ABSTRACT

Based on digital black hole findings, this paper provided a new method for investigating the twin prime number issue. That is, writing down the prime numbers in sequence, counting the number of the prime numbers, the number of the twin prime numbers and the sum of these two numbers from the given numeric string respectively. After iteration repeatedly, the finally result will certainly fall into the black hole of either 000 or 202, testifying that there are infinite numbers of twin prime numbers. This new special method deals with the problem of twin prime numbers easily and effectively with potential application for digital media security.

Keywords: Mathematical Twin Black Holes, Kaprekar Numbers, Digital Storage.

1. INTRODUCTION

Let's look at a matrix: in 1934, one ground breaking mathematician from the Indian/Bangladesh region Harish Chandra (1923–1983), in the field of number theory, has made a founding contributions of harmonic analysis on semisimple Lie groups. This subject is equally important for an engineer, as a synthesis of Fourier analysis, special functions and invariant theory etc., and it has also became a basic tool in analytic number theory, via the theory of automorphic forms, leading to Langlands program eventually. It became one of the major mathematical edifices of the second half of the twentieth century .

2. FIRST CONJECTURE

Chandra matrix is a square sieve, where the first row of the square sieve consists of the first element of 4, the difference between next every two adjacent numbers is 3, forms an arithmetic sequence: 4,7,10, ... The first column equals to the first row. The second row, third row, ... any subsequent rows are also arithmetic sequence, but the difference between two adjacent numbers gradually become larger, and they are 5,7,9,11,13, ... respectively, and they are all odd numbers, and the matrix is symmetrical, as shown below with modulo equivalent representation:

4 7 10 13 16 19 22 25 …… i.e. mod(n,3)=1
7 12 17 22 27 32 37 42 …… i.e. mod(n,5)=2
10 17 24 31 38 45 52 59 …… i.e. mod(n,7)=3
13 22 31 40 49 58 67 76 …… i.e. mod(n,9)=4
16 27 38 49 60 71 82 93 …… i.e. mod(n,11)=5
19 32 45 58 71 84 97 110 ……. i.e. mod(n,13)=6
....
The secret of this square sieve is: If a natural number N appear in the table, then 2N+1 certainly is not a prime number, because 2 times of remaining plus 1 is at least one of the divisors in the above modulo operations. If N does not appear in the table, then 2N+1 is definitely a prime number, because 2 times of remaining plus 1 is not any of the divisor in the above modulo operation.

Primes are left out. Almost all primes can be launched from this table, assume that the number of primes follow the prime number theorem x/ln(x) in arithmetical range of the numbers.

Based on above observations, we made a few similar matrices accordingly (lifting by x):

4+x 7+x 10+x 13+x……. i.e. mod(n,3)=1+ mod(x,3)
7+x 12+x 17+x 22+x……. i.e. mod(n,5)=2+ mod(x,5)
10+x 17+x 24+x 31+x……. i.e. mod(n,7)=3+mod(x,7)
....
Lifting by any positive integer can be obtained if the natural number N in the matrix, 2*N-(2x-1) is certainly not a prime number, if not , 2*N-(2x-1) must be a prime number. If a number N is not in the matrix beginning with 4 and 4+x,then 2N+1and 2N-(2x-1) are primes. If (2N+1)-(2N-(2x-1))=prime-prime=2x, x is all numbers, so 2x is all even numbers!

Now, we have found the N which not in the two matrix.

All the numbers not in the matrix of 4, and if these numbers all appear in the matrix of 4+x, is not set up. Because Numbers in 4 and not in 4 is all numbers, now we assume not in 4 is equally with in 4+x, so numbers in 4 and numbers in 4+x are all numbers, obviously is not set up! Exist infinite N not in the two matrix!

We can get a conclusion: all even numbers can expressed as a prime minutes a prime. And we can also get two conclusions:

（1）There are infinite forms that all even numbers can expresses as a prime minutes a prime.
（2）There are infinite twin primes.

3. SECOND CONJECTURE

One of the old problems of the twin prime numbers is that “ whether there exists an infinite number of twin prime numbers or not ”. At present, the best achievement is made by Yitang Zhang [1]. Dr Zhang proved that there is an n less than or equal to 70,000,000 such that p, p+n are primes, making a great contribution to the twin prime conjecture as verified by Prof. H. Iwaniec, a famous number theorist [2]. Goldston defined the primes as the natural or counting numbers with exactly two factors, namely 1 and themselves, or equivalently the numbers [3]. Albrecht and Firedrake described the theory of mathematical Black Holes that apply a step-by-step procedure to the starting number and get a new number, and if the new number is the same as the starting number, then the starting number is a mathematical black hole [4]. Jones invented the Kaprekar routine when his wife sent him to the supermarket [5]. Siegel showed that subtractive black holes and black loops are generalizations of Kaprekar’s constants, which provided a rich environment for conjecture and proof [6]. Wiegers proposed that the mathematical universe also contains black holes, seemingly innocuous numbers from which no other number can escape [7].

We look into this set of problems for twin prime numbers with a mathematical black hole point of view.

4. ABOUT THE KAPREKAR

CONSTANT

The mathematical black hole is that one arithmetic begins with the integers, and then the result of repeated iteration inevitably fall into a fixed number or several of them, which is called mathematical black hole(s) or digital black hole. In this paper, we defined a so called number theory black hole, i.e. the rule is derived from the number theory, and twin black hole, i.e. the end number is not one, but two.

As Kaprekar [8] described, as long as you input a number of three digits with different numbers in each digit rather than 111, 222 as example. Then, you rank three number in each digit to get the maximum and minimum number respectively according to the order of numerical value. The maximum subtract the minimum to get a new number，which finally become 495 following the method above repeatedly.

For example: input 352 to get the maximum number 532 and the minimum 235 after ranking, 532 minus 235 to 297. Repeat the same arithmetic above continually to get the new number of 693, 594,495 respectively.
Four digits black hole 6174:

Rank the four number of the four-digit number from small to large and large to small to get the maximum and minimum numeric string. The maximum subtract minimum to get a new number. Then repeat the arithmetic above continually. If the four numbers of four-digit number are not same, the numeric string will become 6174 finally. For example, 3109, 9310-0139=9171, 9711-1179=8532, 8532-2358=6174. The number of 6174 will also become 61 7 4 , 7641-1467=6174.

Take the four-digit number 5679 arbitrarily. Take the method above as follows:

9765-5679==4086，8640-0486=8172，
8721-1278=7443， 7443-3447=3996，
9963-3699=6264， 6642-2466=4176
7641-1467=6174

One mathematical black hole:

One mathematical black hole called even odd black hole can be defined like this:
Set up an arbitrary numeric string and count the amount of even number, odd number and total digits of this arbitrary numeric string.

For example: 1234567890,

Even: count the number of even number of this numeric string, 2, 4, 6, 8, 0 in this case, a total of five.
Odd: count the number of odd number of this numeric string, 1, 3, 5, 7, 9 in this case, a total of five.
Sum: count the amount of this numeric string, a total of ten in this case.
New number: rank the order according to the “even-odd-sum” to get a new number: 5510.
Repetition: make the new number 5510 operated by the arithmetic above to get a new number: 134.
Repetition: make the new number 134 operated by the arithmetic above to get a new number: 123.
Conclusion: make 1234567890 operated by the arithmetic above to finally get 123. We can make MATLAB programs with a computer and verify the conclusion to finally get 123 after limited repetition. In other words, the final result of the arbitrary number can not escape from the black hole of 123.

5. THE TWIN PRIMES AND THE

TWIN BLACK HOLES

Similarly we can make following mathematical twin black hole:

Write down the prime number successively and count the number of the prime number，the twin prime number and the sum of two numbers. The finally result will certainly fall into the black hole of 000 or 202.
For example:
2 3 5-3 1 4-2 0 2
2 3 5 7-4 2 6-1 0 1-0 0 0
2 3 5 7 11-5 2 7-3 0 3-2 0 2
2 3 5 7 11 13-6 3 9-1 0 1-0 0 0
2 3 5 7 11 13 17-7 3 10-2 0 2
…………..
Without the exception, the rule is after the first arithmetic, it is obtained: X Y X+Y.
If X is the prime number, it will fall into the black hole of 202. If X is composite number, it will fall into the black hole of 000.

A twin prime is a prime number that is either 2 less or 2 more than another prime number, for example, the twin prime pair (41, 43). In other words, a twin prime is a prime that has a prime gap of two.

In 1849, de Polignac made the more general conjecture that for every natural number k, there are infinitely many primes p such that p + 2k is also prime. The case k = 1 is the twin prime conjecture. On April 17, 2013, Yitang Zhang announced a proof that for some integer N that is less than 70 million, there are infinitely many pairs of primes that differ by N.[9] Zhang's paper was accepted by Annals of Mathematics in early May 2013. Terence Tao subsequently proposed a Polymath Project collaborative effort to optimize Zhang’s bound.[10] As of April 14, 2014, one year after Zhang's announcement, according to the Polymath project wiki, the bound has been reduced to 246.
Twin prime conjecture: there are infinitely many primes p such that p + 2 is also prime.

6. CONDITIONAL PROOF

Let's assume that the twin black holes have no exception for now, we use MATLAB conducted the preliminary search, so far we haven't found any exception. We now assume that there is a finite number of the twin prime numbers. This number is Y. Now, we make a list as follows: X Y X+Y .

X can be arbitrarily large because of infinite prime numbers. If X is the prime number and the sum of X and Y is the composite number, Y must be the prime number, which will fall into the black hole of 202-202. If Y is the composite number, it will fall into the black hole of 101-000. So, Y is the prime number. If X is the composite number, the sum of X and Y is the prime number, Y is odd and composite number and the black hole of 101-000 is obtained. If Y is the prime number, the black hole of 202 is obtained. So, Y is the composite number. Y can not be prime number and the the composite number at the same time, which is contradictory. So, the assumption that Y is finite is incorrect. Therefore, there are countless twin prime Numbers！ End of the conditional proof.

7. CONCLUSION

In this paper, we have proposed a twin black hole constants based on the Kaprekar constants methodology, we further related this mathematical phenomenon with the twin prime conjecture, we provided a conditional proof of the conjecture. The algorithm can find itself some practical application of preventing the malicious time bomb that could destroy some part of the the cloud storage site [11].

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