Consideration of Twin Prime Conjecture average difference is 2.296

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Abstract

I considered the Twin Prime Conjecture.

The probability twin prime approximately is slightly lower than 4/3 times the square of the probability that a prime will appear in.

When the number grows to the limit, the primes to be produced rarely, but since Twin Primes are slightly lower than 4/3 times the square of the distribution of primes, the frequency of production of Twin Primes is very equal to 0.

The places where prime numbers come out are filled with multiples of primes one after another, and eventually disappear almost.
Primes can only occur very rarely when the numbers are huge.
This is natural from the following equation.

$$\pi(x) \sim \frac{x}{\log x} \quad (x \to \infty) \tag{1}$$

$[Probability\ of\ the\ Existence\ of\ primes]^2 \times 4/3 \sim$ (Probability of the Existence of Twin Primes)

When the number becomes extreme, the generation of primes becomes extremely small.
However, it is not 0.
Very few, but primes are generated.

If the twin primes appears as two primes completely independently, Twin Prime Problem is denied.

However, if twin primes appear in combination and appear like primes, twin primes consist forever and Twin Prime Problem is correct.

key words
Twin Primes Conjecture, slightly lower than 4/3 times the square of the probability of primes, average difference is 2.296

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Introduction

In this paper, it is written in advance that 2 and 3 are omitted from primes.

The prime number is represented as (6n -1) or (6n+1). And, n is positive integer.

All Twin Primes are combination of (6n -1) and (6n+1).
That is, all Twin Primes are a combination of 5th-angle and 1th-angle.

[n is positive integer]

5th-angle is (6n -1).
1th-angle is (6n+1).

(6n -2), (6n), (6n+2) in are even numbers.
(6n -1), (6n+1), (6n+3) are odd numbers.

Primes are (6n -1) or (6n+1).
The following is a prime number.
There are no primes that are not (6n -1) or (6n+1).
5 ——— 6n -1 (Twin prime)
7 ——— 6n+1
11 ——— 6n -1 (Twin prime)
13 ——— 6n+1
17 ——— 6n -1 (Twin prime)
19 ——— 6n+1
23 ——— 6n -1
29 ——— 6n -1 (Twin prime)
31 ——— 6n+1
....
....

Part 1

There are 37607912014 primes from 5 to
1×10^{12}.
Probability is $\frac{37607912014}{999999999996}$.
In this, there are 1870585218 Twin Primes. Probability is $\frac{1870585218}{999999999996} = 0.001870585218007...$
and $[\frac{37607912014}{999999999996}]^2 \times \frac{4}{3} = 0.00188580672808544...$

There are 177291661645 primes from 5 to
$5000000000000=5\times10^{12}$.

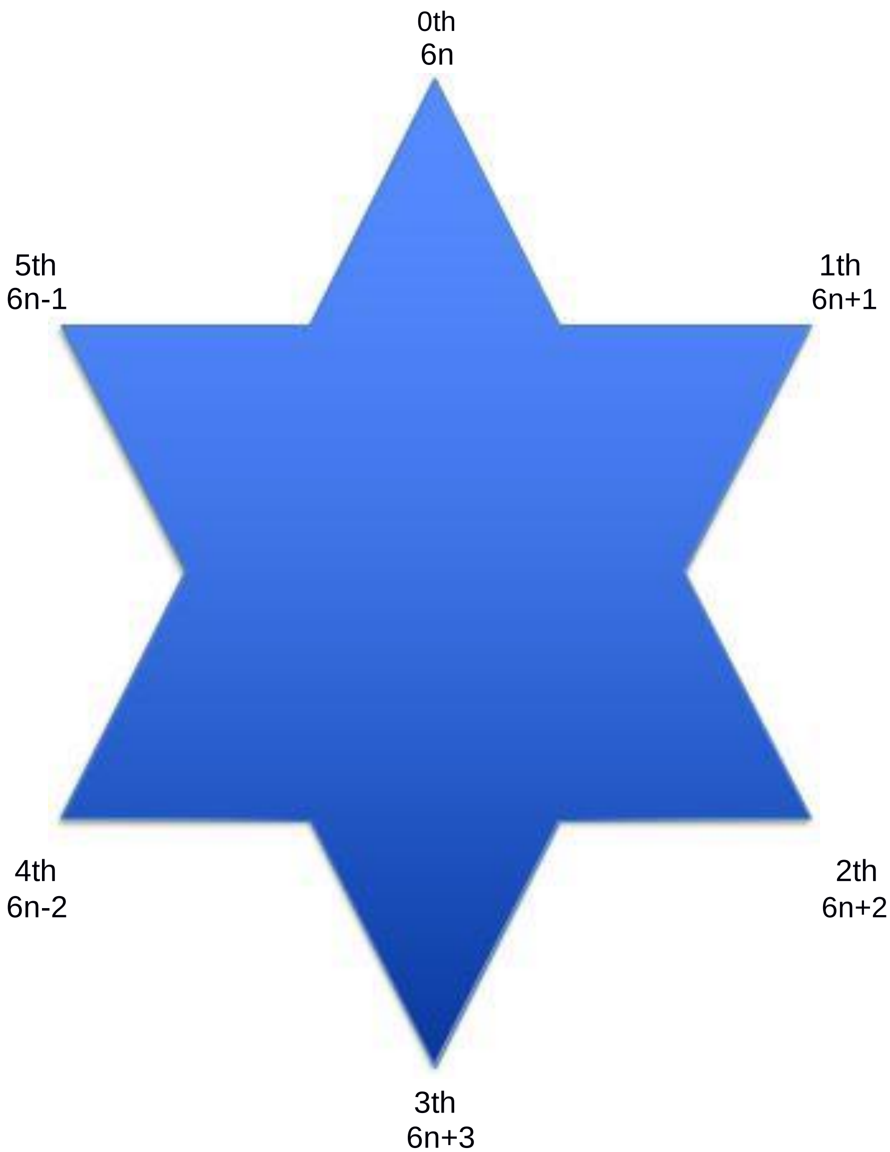
Probability is $\frac{177291661645}{4999999999996}$.
In this, there are 8312493001 Twin Primes. Probability is
$\frac{8312493001}{4999999999996} = 0.00166249860020133....$
and
$[\frac{177291661645}{4999999999996}]^2 \times \frac{4}{3} = 0.00167639110874109...$

Part 2

There are 37607912016-4118054809=33489857207 primes from 1×10^{11} to 1×10^{12}=9×10^{11}.
Probability is $\frac{33489857207}{900000000000}$=0.0372109524522...
In this, there are 1870585219-224376047=1646209172 Twin Primes. Probability is
$\frac{1646209172}{900000000000}$=0.00182912130222...
and
$[\frac{33489857207}{900000000000}]^2 \times \frac{4}{3}$=0.0018462066432020...

There are 17729166164-3760791201=13968374963 primes from 1×10^{12} to 5×10^{12}=4×10^{12}.
Probability is $\frac{13968374963}{400000000000}$=0.0349209374075
In this, there are 8312493001-1870585219=6441907782 Twin Primes. Probability is
$\frac{6441907782}{400000000000}$=0.0016104769455
and
$[\frac{13968374963}{400000000000}]^2 \times \frac{4}{3}$=0.001625962492558...

Calculation depends on Wolfram Alpha and Wolfram Cloud.


0th
6n
5th
6n-1
1th
6n+1
4th
6n-2
2th
6n+2
3th
6n+3

Discussion

At this stage, it is slightly lower than 4/3, but it is unpredictable how it will change as the number grows.
However, it is expected to settle at a slightly lower value than 4/3.
The need for a constant suggest that the prime numbers (6n -1) and (6n+1) do not occur independently.

First, say 6n -1 = 6n+5

$(6n-1) \times 5$ =6(5n -1)+1= 1th-angle.
$(6n+1) \times 5$ =6(5n)+5= 5th-angle.
and
$(6n-1) \times 7$ =6(7n -2)+5= 5th-angle.
$(6n+1) \times 7$ =6(7n+1)+1= 1th-angle.
and
$(6n-1) \times 11$ =6(11n -2)+1= 1th-angle.
$(6n+1) \times 11$ =6(11n+1)+5= 5th-angle.
and
$(6n-1) \times 13$ =6(13n -3)+5= 5th-angle.
$(6n+1) \times 13$ =6(13n+2)+1= 1th-angle.
and
$(6n-1) \times 17$ =6(17n -3)+1= 1th-angle.
$(6n+1) \times 17$ =6(17n+2)+1= 5th-angle.
and
$(6n-1) \times 19$ =6(19n -4)+5= 5th-angle.
$(6n+1) \times 19$ =6(19n+3)+1= 1th-angle.
and
$(6n-1) \times (6n-1) = 6(6n^2 - 2n) + 1$= 1th-angle.
(6n -1)$\times(6n+1) = 6(6n^2) - 1 = 6(6n^2 - 1) + 5$= 5th-angle.
and
$(6n+1) \times (6n-1) = 6(6n^2) - 1 = 6(6n^2 - 1) + 5$= 5th-angle.
(6n+1)$\times(6n+1) = 6(6n^2$+2n)+1= 1th-angle.

In this way, prime multiples of (6n -1) or (6n+1) of primes fill 5th-angle, 1th-angle, and the location of primes becomes little by little narrower.

However, every time the hexagon is rotated once, the number of locations where the primes exists increases by two.

The probability that a Twin Prime will be produced slightly lower than 4/3 times the square of the probability that a prime will be produced in a huge number, where the probability that a prime production is low from the equation (1).

And, as can be seen from the equation below, even if the number becomes large, the degree of production of primes only decreases little by little.

$$\pi(x) \sim \frac{x}{\log x} \quad (x \to \infty) \tag{2}$$

$\log(10^{20}) = 20\log(10) \approx 46.0517018$
$\log(10^{200}) = 200\log(10) \approx 460.517018$
$\log(10^{2000}) = 2000\log(10) \approx 4605.17018$
$\log(10^{20000}) = 20000\log(10) \approx 46051.7018$
$\log(10^{200000}) = 200000\log(10) \approx 460517.018$

As x in $\log(x)$ grows to the limit, the denominator of the equation also grows extremely large. Even if primes are produced, the frequency of production is extremely low.
The production of Twin Primes is slightly lower than 4/3 times the square of the production frequency of primes, and the production frequency is extremely low.

In the following, the value of $1{\times}10^{24}$ depends on [5].
And, the following, the value of from $1{\times}10^{4}$ to $1{\times}10^{13}$ depends on [4].

Average difference is (54.24287859-28.9862524)/11=2.296056926...

Sheet1

number	number of primes	distribution(bk/ak)	average(ak/bk)	average difference
10000	1229	12.29	8.13669650122	2.28865796083121
100000	9592	9.592	10.4253544621	2.31382360617933
1000000	78498	7.8498	12.7391780682	2.30794198822576
10000000	664579	6.64579	15.0471200565	2.30960667316272
100000000	5761455	57.61455	17.3567267296	2.30991039775819
1000000000	50847534	50.847534	19.6666371274	2.30884868639028
10000000000	455052511	45.5052511	21.9754858138	2.30782379258232
100000000000	4118054813	41.18054813	24.2833096064	2.29977133449257
1000000000000	37617912018	37.617912018	26.5830809408	2.31317149075089
10000000000000	346065636839	34.6065636839	28.8962524316	2.296
1*10^14			31.1902524316	2.296
1*10^15			33.4842524316	2.296
1*10^16			35.7782524316	2.296
1*10^17			38.0722524316	2.296
1*10^18			40.3662524316	2.296
1*10^19			42.6602524316	2.296
1*10^20			44.9542524316	2.296
1*10^21			47.2482524316	2.296
1*10^22			49.5422524316	2.296
1*10^23			51.8362524316	
1*10^24	1.84355997673492E+22	18.43559976734	54.24287859	

The production of Twin Primes equal the existence of Twin Primes. And, the production of Primes equal the existence of Primes.

Use a contradiction method.
If the Twin Primes is finite, the primes is finite.
This is because slightly lower than 4/3 times the square of the probability of primes is the probability of Twin Primes.
This is contradiction. Because there are an infinite of primes.

$[Probability\ of\ the\ Existence\ of\ primes]^2 \times 4/3 \sim$ (Probability of the Existence of Twin Primes)

However, this contradiction method goes away.

When the number becomes very large and approaches the limit, the probability that a prime number will occur will approach zero as much as possible.

The probability of squaring this is almost zero. Twin primes do not occur.
If twin primes are generated independently.

The average difference is always constant, indicating that the above-mentioned formula, which has been known for a long time, is correct.

That is, when the number becomes very large, the occurrence of primes decreases, and when the number reaches the limit, the primes hardly appear.

If the twin primes appears as two primes completely independently, Twin Prime Problem is denied.

However, if twin primes appear in combination and appear like primes, two primes consist forever and Twin Prime Problem is correct.

If twin prime numbers occur completely independently, a correction value slightly lower than 4/3 is not necessary.

However, it has a correction value slightly lower than 4/3, and the correction value is larger than 1 and takes a value of about 1.3.

If it happens completely independently, no correction value is needed.

The need for a correction value of about 1.3 is relevant and it can be determined that twin primes are occurring, but it seems difficult to determine that they are completely related.

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