

The Proof and Decryption of Goldbach Conjecture [†]

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Abstract: In this paper, a few mathematical bases are given firstly. Then, the step thinness τ_p of primes is given as $\tau_p = L_01 = P1 \Pi P / (P-1)$ for the inner character, having an $\ln X$ logarithmic outer character. The “best estimation and mutual exchange equivalent” are easily obtained as $L_01 = P1 \Pi P / (P-1) \sim \tau_p \sim \ln X(\epsilon)$. This is the principal contradiction, and P is the main aspect. Then, the sparsity τ_t of twin primes is defined as $L_02 = \tau_t = P2 \Pi P / (P-2) = C2 L_01^2 = C2 \ln^2 X (C2 = 0.75739006)$. Then, the sparsity τ_g of the Goldbach pair and τ_b of both the twin and Goldbach pairs are obtained as $L_03 = \tau_g = \{2L_01, L_01^2, 2C2 L_01^2\}$ and $L_04 = \tau_b = 4.7 L_01^3$ (or they are omitted). Lastly, all conjectures can be proved with the same frame formula, $N = X / LOK$. The twin prime conjecture and Goldbach conjecture low bound are clearly and accurately proved with $T = X / (C2 L_01^2) = 1.32032X / \ln^2 X$ and $Gd = X / (2C2 L_01^2) = 0.66016X / \ln^2 X$. Using $L_01 + C2$ to decrypt the Selberg formula $C(\omega) = 2C(N)$ obtains the totally same results.

Keywords: filter-sifter; sparsity density τ ; twin pair; twin bridge; Goldbach pair; principal contradiction

1. Introduction

Goldbach’s conjecture is a worldwide problem, which has caused many mathematicians to study it. This paper studies the top design and technical route to solve pure primes, twin prime pairs, and Goldbach prime pairs, i.e., all PPP, or prime property problems (Figure 1).



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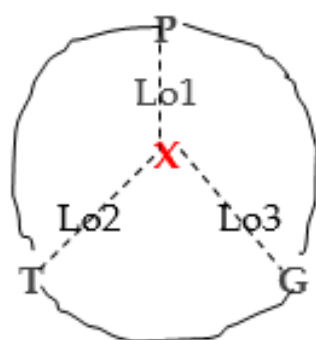


Figure 1. Top design figure of solving Goldbach’s conjecture.

Frame formula expression: $\{P, T, G\} = X / Lok$ [1].

G: Goldbach conjecture (being wavy).

In this top design diagram, using L_01 , L_02 , and L_03 , all $\{P, T, G\} = X / Lok$ expressions can be obtained.

($Z = PR \leq \sqrt{X}$ is the necessary or critical point, and $X/2$ is the sufficient point for the sieve principle).

2. Pure Primes (P)

According to filter-sifter (sieve) principle, $Lo1 = P1 \prod P/(P-1)$ is defined for pure prime numbers.

$P1 = 1, P2 = 2, P3 = 3, P4 = 5, \text{ and } P5 = 7 \dots; Z = PR \leq \sqrt{X}$ is the necessary or critical point for the sieve principle.

The function $\prod P/(P-1)$ is called the Euler function or Riemann function, which previous mathematicians proved before. Here is a newer and more primary proof as follows:

X's factorial: $\prod X = 1*2*3*4*5*6 \dots *X = X!$

Prime's factorial: $\prod P = 2*3*5*7 \dots *P = P!$

Composition's factorial: $\prod C = 4*6*8*9 \dots *C = C!$

Ratio product: $\prod X/(X-1) = 2/1 * 3/2 * 4/3 * 5/4 \dots X/(X-1) = X$

$= (X/(X-1))! = \prod (P/(P-1)) * (C/(C-1)) = (P/(P-1))! * (C/(C-1))! = X.$

The geometric average must be $\sqrt{X}$.

Let $Lo1 = \prod (P/(P-1))$ and $Loc = \prod (C/(C-1))$:

$X = 6 \ 15/4 = 3.75 \ 24/15 = 1.6.$

$10 \ 4.375 \ 2.2857$

$47 \ 7.209592623 > 6.519092349$

$52 < 7.212612812$

$53 \ 7.348238615 >$

$54 < 7.348699846$; the later Loc is greater.

Geometric average $\sqrt{X}$ must not be changed.

Hence, $Lo1 << \sqrt{X} << Loc$; $\sqrt{X}$ is the watershed, and $Lo1$ is the sparsity function of the sieve principle.

$\because \sqrt{X}$ is the watershed.

$\because Np = X/Lo1 \gg \sqrt{X}$; this means prime numbers must be infinite ∞ .

$Lo1 = \prod P/(P-1) \approx \tau_p \approx \ln X$, i.e., the inner character and outer character are equivalent. The authors of paper [2], with results of (10.16)~(10.24), proved this equation, but the inner character was not used.

The double-face prime number theorem is proved.

QED.

3. Twin Pairs (T)

And similarly [3],

$Lo2 = P2 \prod P/(P-2) = C2Lo1^2 = C2\ln^2 X$ ($C2 = 0.75739006$) identifies twin prime pairs.

The step constant $C2$ (twin bridge) is obtained from $Lo2 = P2 \prod P/(P-2) = C2Lo1^2$.

$C2 = 1/2 \prod (P-1)^2/(P(P-2)) = 0.75739006 \dots$

4. Gold Pairs (G)

Also similarly [4],

$Lo3 = \{2Lo1, Lo1^2, 2C2Lo1^2\}$ for the Goldbach conjecture pairs of up, average, and down.

So, $\{Gu, Ga, Gd\} = X/Lo3$ can be obtained.

5. All {PP, TP, GP} Formal Proofs

Frame formula expression: $\{P, T, G\} = X/Lok$; $Lo1 = P1 \prod P/(P-1) \sim \tau_p \sim \ln X(\epsilon)$.

Independent proofs:

5.1. $\because Lo1 = \prod P/(P-1) \approx \tau_p \approx \ln X(\epsilon)$.

$\because Np = X/Lo1$ (X is out bound, $Z = PR \leq \sqrt{X}$ is the necessary point, and P is the filter variable.)

5.2. $\because Lo2 = 2 \prod P/(P-2) = C2Lo1^2$.

$\because T = X/Lo2 = X/C2Lo1^2 = 1.32032X/Lo1^2$.

5.3. $\because Lo3 = 2*2 \prod P/(P-(1+X\%P! = 0)) = \{2Lo1, Lo1^2, 2C2Lo1^2\}$ wavy.

$\because G = \{Gu, Ga, Gd\} = \{Np/2, X/Lo1^2, 0.66016 X/Lo1^2\}$ wavy.

5.4. $\because Lo4 = 4.7Lo1^3$.

$\because B = X/Lo4 = X/(4.7\ln^3 X)$, (reasoning process omitted).

QED.

Decryption proofs: (using $Lo1 + C2$ to decrypt the Selberg formula $C(\omega) = 2C(N)$ as follows:)

$\because C(K) = LOK$ is for the denominator in the GES method, $\because N = X/LOK$, while
 $\because C(\omega) = 2C(N)$ is for the numerator in the SES method, $\because N = C(\omega) \mid 2C(N) \cdot X/\ln^2 X$.

Therefore,

here $Lo1 \sim \tau p \sim \ln X$; (equivalent mutual exchange).

$\because Lo1 = \ln X \therefore$ decrypt: $C(\omega) = 2C(N) = (!)Lo1/(!)C2$.

$Np = X/Lo1 \quad Np = (!)C(\omega) = Lo1 \cdot X/Lo1^2 = X/Lo1$.

$T = X/Lo2 = X/C2Lo1^2 = 1.32032X/Lo1^2 \quad T = (!)C(\omega) = X/C2Lo1^2 = X/C2Lo1^2 = 1.32032X/Lo1^2$.

$G = X/Lo3 = X/\{2Lo1, Lo1^2, 2C2 Lo1^2\} = \{Gu = Np/2, Ga = X/Lo1^2, \text{ and } Gd = 0.66016 X/Lo1^2\}$

while $3E: E1 = \{P!\}$, $E2 = \{\text{others}\}$, and $E3 = \{2^n\}$ to meet.

$Lo4 = 4.7Lo1^3$ (reasoning process omitted).

Horizontal compression ratio Np/T equals vertical wavy ratio $Gu/Gd = C2Lo1$.

Decrypt QED.

6. Conclusions

Due to all the above, all $\{PP, TP, GP\}$ can be obtained using $\{P, T, G\} = X/Lok$, and in using $Lo1 + C2$, all $PPP\{PP, TP, GP\}$, i.e., $\{P, T, G\}$ i.e., pure primes, twin pairs, and Goldbach pairs, are totally proved and decrypted. So, all of the prime problems, including the Goldbach conjecture, are totally solved with $Gd = 0.66016 X/Lo1^2$. This is the fundamental conclusion of this paper [4].

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