Proof of the Goldbach's conjecture

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Abstract:

That is, any large even number can be written as the sum of two prime numbers, which is also called "strong Goldbach's conjecture" or "Goldbach's conjecture about even numbers".

Based on the equality of the sum of all odd numbers and the equality of odd numbers, the values and numbers of prime numbers pr1 and pr2 are separately screened out from the odd combination. By using the equality of the sum of all odd numbers and the equality of all odd numbers, an identity is constructed to obtain 2n=pr1+pr2

Keywords: Prime

Prime numbers generally refer to prime numbers. A prime number refers to a natural number that has no other factors than 1 and itself among natural numbers greater than 1.

On the number axis, it is known that there is a prime number $\mathrm{pr}_1 = n - k_1$ in the interval $[3, n]$, $n \in N, k_1 \in N$, and $0 \le k_1 \le n$

According to Chebyshev, there is a prime number $\mathrm{pr}_2 = n + k_2$ in the interval $[n, 2n]$, $n \in N, k_2 \in N$, and $0 \le k_2 \le n$

The value of subtracting prime pr_1 and prime pr_2 from all odd sum $\sum_{n=1}^{+\infty}(2n-1)$ is represented by the following formula:

$$\sum_{n=1}^{+\infty}(2n-1) - pr_1 - pr_2 = \sum_{n=1}^{+\infty-2}(2n-1)$$

The value of $(+\infty - 2)$ represents a decrease of 2 for all odd numbers, $\sum_{n=1}^{+\infty-2}(2n-1)$ represents the value of all odd sum $\sum_{n=1}^{+\infty}(2n-1)$ minus the values of prime pr_1 and prime pr_2.

We subtract the prime pr_1 from the prime pr_2 to obtain $k_2 + k_1$:

$$pr_2 - pr_1 = k_2 + k_1$$

Because both pr_1 and pr_2 are odd prime numbers, the value of $k_2 + k_1$ must be even, so

k_1 and k_2 are either both even or odd, so $k_2 - k_1$ must also be even or 0.

because $(k_2 - k_1) < n$, then we must be able to peel off an odd or an odd prime number

$X = [(2x-1)+(k_2-k_1)]$ in $\sum_{n=1}^{+\infty-2}(2n-1)$, Because of the uniqueness of prime numbers, the

value of $[(2x-1)+(k_2-k_1)]$ must not be equal to pr_1 or pr_2, we use the following expression:

$$\sum_{n=1}^{+\infty-3}(2n-1)+[(2x-1)+(k_2-k_1)]=\sum_{n=1}^{+\infty-2}(2n-1) \tag{1}$$

Immediately available:

$$\sum_{n=1}^{+\infty-3}(2n-1)+[(2x-1)+(k_2-k_1)]+pr_1+pr_2=\sum_{n=1}^{+\infty-2}(2n-1)+pr_1+pr_2=\sum_{n=1}^{+\infty}(2n-1) \tag{2}$$

Now we will perform the following deformation operations on equation (1):

$$\begin{aligned}&\sum_{n=1}^{+\infty-3}(2n-1)+[(2x-1)+(k_2-k_1)]+n+n\\&=\sum_{n=1}^{+\infty-3}(2n-1)+(2x-1)+(n-k_1)+(n+k_2)\\&=\sum_{n=1}^{+\infty-3}(2n-1)+(2x-1)+pr_1+pr_2\end{aligned}$$

And because $(2x-1)\in\{2n-1\}$, then $\sum_{n=1}^{+\infty-3}(2n-1)+(2x-1)=\sum_{n=1}^{+\infty-2}(2n-1)$

So:

$$\sum_{n=1}^{+\infty-3}(2n-1)+[(2x-1)+(k_2-k_1)]+n+n=\sum_{n=1}^{+\infty-2}(2n-1)+pr_1+pr_2=\sum_{n=1}^{+\infty}(2n-1) \tag{3}$$

From equations (2) and (3), it can be concluded that: $2n = pr_1 + pr_2$

Known: $pr_1 = n - k_1$ and $pr_2 = n + k_2$,The relationship between k_1 and k_2 can be immediately obtained as: $k_1 = k_2$ (This is an exciting discovery)

Conclusion: Any large even number $2n$ ($n \geq 3$)can be expressed by the sum of two prime numbers, and the strong Goldbach's conjecture is true.

References

1.Green, B. and Tao, T.. The primes contain arbitrarily long and arithmetic progression. Annals of Mathematics. 2005-09-12