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Goldbach's Conjecture

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Abstract

In this paper I am trying to prove the Goldbach's Conjecture by simplest method by taking example of first even prime number upto number 60 and taking consideration from the analysis for primes and non primes meetings these allow to calculate minimum number of pair which gives one pair meeting that is required is at least one prime pair.

Keywords: Prime Numbers, Goldbach's Interger (Goldbach's Natural Numbers) Strong, Goldbach's Conjecture, Weak Goldbach's Conjecture

Introduction

In this paper we discuss Goldbach's Conjecture it states that every even number greater than two can be written as the sum of two primes (the same prime may be used twice). A Goldbach number is a positive integer that can be expressed as the sum of two primes. Since four is the only even number greater than two that requires the even prime 2 to be written as the sum of two primes, another form of the statement of Goldbach's conjecture is that all even integers greater than 4 are Goldbach numbers.

It is one of the oldest unsolved problems in number theory and in all of mathematics this conjecture is divided into two parts known as the weak and strong conjecture Goldbach originally described his conjectures in a letter to Leonhard Euler in 1742.

"Every number greater than five can be written as the sum of three primes" (weak) and"every even number greater than two can be written as the sum of two primes" (strong) the conjecture has had additions since Goldbach's original theory was presented.

Aim of the Study

The aim of study of this Paper is to check the hypothesis about Goldbach Conjecture and to improve the mathematical point from historical point of view.

Review of Literature

The Miles Mathis gives simple proof of goldbach conjecture by analyzing the partition of primes and non primes and also gave formal proof in fractions. Nils pipping and Oliveira Silva is verified the conjecture by using computer for $n \leq 4 \times 10^{18}$ and they found the partition of even number as sum of primes. Goldbach's conjecture has been researched and the majority of mathematicians believe the (strong) conjecture to be true. A British publisher offered a $ 1,000,000.00 prize for proof of the conjecture. The offer expired in 2000 and was unclaimed.

Analysis

The expression of a given even number as a sum of two primes is called a Goldbach partition of that number. The following are examples of Goldbach partitions for some even numbers.

Even Number	Partition of Even Number to Prime No.	No. of Ways
4	2+2	1
6	3+3	1
8	3+5	1
10	3+7,5+5	2
12	5+7	1
14	3+11,7+7	2
16	3+13,5+11	2
18	7+11,5+13	2
20	7+13,3+17	2
22	11+11,5+17,3+19	3
24	11+13,7+17,5+19	3
26	13+13,7+19,3+23	3
28	11+17,5+23	2
30	13+17,11+19,7+23	3

32	13+19,3+29	2
34	17+17,23+11,5+29,3+31	4
36	17+19,13+23,7+29,5+31	4
38	19+19,7+31	2
40	17+23,11+29,3+37	3
42	19+23,29+13,31+11,37+5	4
44	13+31,37+7,41+3	3
46	23+23,29+17,41+5,43+3	4
48	29+19,31+17,37+11,41+7,43+5	5
50	19+31,13+37,43+7,47+3	4
52	29+23,41+11,47+5	3
54	43+11,31+23,47+7,37+17,41+13	5
56	19+37,53+3,43+13	3
58	29+29,53+5,41+17,47+11	4
60	29+31,23+37,53+7,41+19,43+17, 47+13	6

From the above table the number of ways in which even can be expressed as sum of two primes respectively as

1, 1, 1, 2, 1, 2, 2, 2, 2, 3, 3, 3, 2, 3, 2, 4, 4, 2, 3, 4, 3, 4, 5, 4, 3, 5, 3, 4, 6 and so on. As we see the partition of every even number to prime number in different number of ways. for small even numbers the strong goldbach's conjecture and weak Goldbach's Conjecture can be solved directly as solved in above table .

By Principal of Mathematical Induction

$$\mathrm{E} = \mathrm{p}_1 + \mathrm{p}_2$$
$$E + 2 = p_1 + p_2 + 2$$
$$E + 2 = (p_1 + a) + (p_2 + b)$$

Where E is even number and p_1, p_2 are prime numbers now a+b=2 which is also prime, as proved by Principal of mathematical induction and $E + 2$ can be expressed as sum of two prime numbers $p_1 + a$ and $p_1 + b$. As from the equation $E + 2 = p_1 + p_2 + 2$,In general Even number four can be expressed as(4 =2+2), 2 is the only even prime number 6=3+3 or (6= 2+2+2) here six can be expressed as sum of two odd primes or (it can be expressed as sum of three prime numbers which was proved earlier by Euler in in 1742) which is same,as 2 is the unique even prime number . As in case of even number eight (8=3+5) it can be expressed as sum of two different odd primes and this results holds good for all even numbers between six to even number sixty as expressed in above table. for even number 100, Express 100 as sum of two prime numbers p and q when p=2, 100=2+98 (even prime + non prime)

When P=3, 100=3 + 97 (Odd Prime + Odd Prime)

when p=5, 100=5 + 95 (odd prime + non prime)
when p=7, 100=7 + 93 (odd prime + non prime)

When P=11, 100=11 + 89 (Odd Prime + Odd Prime)

when p=13, 100=13 + 87 (odd prime + non prime)

When P=17, 100=17 + 83 (Odd Prime + Odd Prime)

and so on 100 can be expressed as sum of odd primes in six different ways as

100= 3+97 = 11+89 = 17+83 = 29+71 = 47+53 = 41+59

For even number 1000= 2+998 (even prime + non prime)

When p=3, 1000 = 3+997 (Odd Prime + Odd Prime) and so on this results holds for all even numbers**.**

Conclusion

As from the above analysis in case of even number four and even number six it is concluded that "Every even number greater than two can be expressed as at least one pair of odd primes except even number four", as well as in case of even number eight and from above table upto even number sixty and on partitioning100 and 1000 in terms of prime numbers it is concluded that "Every even number greater than six can be expressed as at least one pair of different odd primes".

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