the distance between infinite prime numbers is ≥ 2

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Abstract: Euclid and other mathematicians have demonstrated that prime numbers are infinite and, not being able to state how many prime numbers there are and how much time and space is needed to know their value, to satisfy the twin prime conjecture or Goldbach's conjecture , it will never be possible to elaborate all the possible combinations and values that can be obtained by adding two or three of the infinite prime numbers but it is possible to know all the possible combinations and values that can be obtained by adding two or three of the prime numbers, known, which are less than or equal to 2n+1.

1. Euclid, in 300 BC. he stated and demonstrated that there are more prime numbers than one can imagine and his proof is based on the fact that, if there were a finite number of prime numbers, the product of known primes added to 1 (2n+1), it would not imply the existence of other prime numbers and has stated that the result of a product of prime numbers is divisible by the prime numbers that generated it.

1.1 Gauss with the Fundamental Theorem of Arithmetic demonstrated that every integer greater than 1 is a prime number or a composite number and can be written as a product of prime numbers, but, when he was a boy, he solved a problem having realized that the even number 100 is the sum of two numbers equidistant from its half and obtained the required result by processing an odd number such as 100+1=2n+1 equal to (101-2n≥1)+(1+2n≥1). Gauss proved that all numbers greater than 1 are the product of prime numbers, but he defined his 100+1 as, 2000 years earlier, Euclid defines 2n+1 as one of the odd numbers; the 101 as all the odd ones become the sum of an even number (2n-2n≥1) plus an odd number (1+2n≥1).

2. **The combinatorics of prime numbers:** Euclid and other mathematicians demonstrated that the prime numbers are infinite and, not being able to state how many prime numbers there are and how much time and space are needed to know their value, to satisfy Goldbach's conjecture, they cannot it will never be possible to elaborate all the possible combinations and the values that can be obtained by adding two or three of the infinite prime numbers but it is possible to know all the possible combinations and the values that can be obtained by adding two or three of the known prime numbers which are less than or equal to 2n+1. **(Annex A)**

2.1 In an even number all even numbers and all odd numbers ≥ ½ 2n are equidistant, from the middle of 2n, with even numbers and odd numbers ≤ ½ 2n; in an even number 2n, the numbers that are not multiples of the primes ≤ the square root of the given even number are prime numbers; all prime numbers factors of n that are less than ½ 2n are equidistant from half the even number. Prime numbers ≥ ½ 2n are equidistant, from half the even number, with prime numbers ≤ ½ 2n. There cannot be a finite number of combinations of prime numbers ≥ ½ 2n equidistant with prime numbers ≤ ½ 2n because they would all be factors of 2n and a new prime number in the double of n would not exist.

2.2 With the three primes considered by Euclid, 2, 3 and 5, and represented above with 2n+1, we obtain 31 with the pairs of an even number plus a known prime number and they are 2+29, 28+3 and 26+5 but between the largest of the factors and the generated number, (between 5 and 31), there are new prime numbers which, added to an even number, generate 31 and are: 24+7; 20+11; 18+13; 14+17; 12+19, 8+23; on 2+29. In fact, between a prime number ≤ 2*3*5+1 and its preceding prime the distance is ≥ 2: between 31 and 29, between 19 and 17, between 13 and 11, between 7 and 5, between 5 and 3 the distance is 2; between 11 and 7, between 17 and 13, between 23 and 19 the distance is 4; between 29 and 23 the distance is 6, the difference/distance between prime numbers is 2*n≥1.

2.3 31, generated by Euclid with 2*3*5+1, is a prime number and this, like all prime numbers greater than 5, denies the existence of a finite number of prime numbers. The 31 which is the sum of an even number (2n) with 1 and which is also the sum of an even number (2n-2*n≥1) with a prime number ≥ (1+2*n≥1) . The difference between an odd number (2n+1) and a prime number (≥3) will always be an even number 2n which is the sum of two numbers that are equidistant by ½ of their sum ((n ≤ ½ 2n + n ≥ ½ 2n) = 2n). The prime number 31 and the prime number 29 form a pair of twin primes, their difference is 2 and, all pairs of twin primes, ≤ 2n+1, are equidistant from other pairs of smaller twin primes; **(Annex B)**

4. Euclid 2300 years ago proved that prime numbers are infinite with 2n+1 and stated, and Gauss 2000 years later proved, that all numbers greater than 1 are prime or composite and are the product of prime numbers. Euclid proved that all odd numbers that are the result of the sum of an even number 2n plus 1, are also equal to the sum of an even number (2n-2*n≥1) plus a prime number (1+2*n ≥1). An even number is the sum of two prime numbers it contains and which are equidistant from the middle of 2n. It is not possible to obtain the combinatorics of infinite prime numbers but one can obtain the combinatorics of known primes in an even number.

4.1 The twin conjecture is satisfied by two prime numbers, 2 apart from each other, both equidistant 1 from half their sum which is an even number 2n whose factors are known. The infinite odd numbers, 2n+1, are the sum of an even number 2n, whose factors are known +1 and are the sum of three prime numbers of which: two of the three primes generate the even number 2n=2n-2n≥ 0 and the third prime is less than (2n+1) and equal to (1+2n≥1).

the distance between infinite prime numbers is ≥ 2

2n + 1			2n is the sum of two numbers equidistant from ½ 2n				
pari 2n		~~dispari~~	n ≥ ½ 2n→	15 17 19 21 23 25 27 29 31	↓(2n≥1)+(1+2n≥0)↓	1	
30	**+**	**1**	∞ gemelli	7 ± ½ 15-1 = 14	**2*15 + (1+0)**	**2**	
28	**+**	**3**	3-1 = 2	6 ± ½ 15-3 = 12	**2*14 + (1+2)**	**3**	
26	**+**	**5**	5-3 = 2	5 ± ½ 15-5 = 10	**2*13 + (1+4)**	**5**	
24	**+**	**7**	7-5 = 2	4 ± ½ 15-7 = 8	**2*12 + (1+6)**	**7**	
22	**+**	~~**9**~~	9-7 = 2	3 ± ½ 15-9 = 6	**2*11 + (1+8)**		**9**
20	**+**	**11**	11-9 = 2	2 ± ½ 15-11 = 4	**2*10 + (1+10)**	**11**	
18	**+**	**13**	13-11 = 2	15-13 = 2	**2* 9 + (1+12)**	**13**	
16	**+**	~~**15**~~	15-13 = 2	15-15 = 0 13+17 = 30 11+19 = 30 9+21 = 30 7+23 = 30 5+25 = 30 3+27 = 30 1+29 = 30	**2* 8 + (1+14)**		**15**
14	**+**	**17**	19-17 = 2	17-15 = 2	**2* 7 + (1+16)**	**17**	
12	**+**	**19**	21-19 = 2	2 ± ½ 19-15 = 4	**2* 6 + (1+18)**	**19**	
10	**+**	~~**21**~~	23-21 = 2	3 ± ½ 21-15 = 6	**2* 5 + (1+20)**		**21**
8	**+**	**23**	25-23 = 2	4 ± ½ 23-15 = 8	**2* 4 + (1+22)**	**23**	
6	**+**	~~**25**~~	27-25 = 2	5 ± ½ 25-15 = 10	**2* 3 + (1+24)**		**25**
4	**+**	~~**27**~~	29-27 = 2	6 ± ½ 27-15 = 12	**2* 2 + (1+26)**		**27**
2	**+**	**29**	31-29 = 2	7 ± ½ 29-15 = 14	**2* 1 + (1+28)**	**29**	
0	**+**	**31**		distance (½2n+2*n≥1) - (½2n-2*n≥1)		**31**	
2n = ½ 2n + ½ 2n			↑∞ twins	**15 13 11 9 7 5 3 1**	**← n ≤ ½ 2n**	**primi ↑**	**multipli↑**
distance between two primes →			2+2*0=2	2+2*1 =4 cousins 2+2*2 =6 sexy	2 + 2*3= 8 →...← there is a max distance between 2 primes but not a max		

annex B ↑

in infinite 2n there is always the combinatorics of prime numbers ≤½2n with prime numbers ≥ ½2n

Prime numbers ≤ 31-2n≥0 →					2	3	5	7	11	13	17	19	23	29
↓ 2n = (2n+1)-(1+2n≥0)														
30	15	½ 30 = 15	15 + 0	½	+0+2	15	17	19	21	23	25	27	29	
	0		15 - 0		-0-2	15	13	11	9	7	5	3	1	
28	14	½ 28 = 14	14 + 1	½	+1+2	15	17	19	21	23	25	27		
	1		14 - 1		-1-2	13	11	9	7	5	3	1		
26	13	½ 26 = 13	13 + 0	½	+0+2	13	15	17	19	21	23	25		
	0		13 - 0		-0-2	13	11	9	7	5	3	1		
24	12	½ 24 = 12	12 + 1	½	+1+2	13	15	17	19	21	23			
	1		12 - 1		-1-2	11	9	7	5	3	1			
22	11	½ 22 = 11	11 + 0	½	+0+2	11	13	15	17	19	21			
	0		11 - 0		-0-2	11	9	7	5	3	1			
20	10	½ 20 = 10	10 + 1	½	+1+2	11	13	15	17	19				
	1		10 - 1		-1-2	9	7	5	3	1				
18	9	½ 18 = 9	9 + 0	½	+0+2	9	11	13	15	17				
	0		9 - 0		-0-2	9	7	5	3	1				
16	8	½ 16 = 8	8 + 1	½	+1+2	9	11	13	15					
	1		8 - 1		-1-2	7	5	3	1					
14	7	½ 14 = 7	7 + 0	½	+0+2	7	9	11	13					
	0		7 - 0		-0-2	7	5	3	1					
12	6	½ 12 = 6	6 + 1	½	+1+2	7	9	11						
	1		6 - 1		-1-2	5	3	1						
10	5	½ 10 = 5	5 + 0	½	+0+2	5	7	9						
	0		5 - 0		-0-2	5	3	1						
8	4	½ 8 = 4	4 + 1	½	+1+2	5	7							
	1		4 - 1		-1-2	3	1							
6	3	½ 6 = 3	3 + 0	½	+0+2	3	5							
	0		3 - 0		-0-2	3	1							
4	2	½ 4 = 2	2 + 1	+ ½ -	2	3	2n = 4 is the only even number							
	1		2 - 1		2	1	that is equal to the sum 2 + 2							

↑2↑	distance 2n successive	½ 2n ± 1	→	0	4	8	12	16	20	24	28	32	equidistant from ½	→ n.simo + 4
		½ 2n ± 0	→	2	6	10	14	18	22	26	30	34		

The combinatorics that cannot be obtained with the infinite prime numbers can be obtained with two of the prime numbers contained in the even number 2n which, added to 1 or (2n-2n≥1) + (1+2n≥1), generates the odd numbers. The even numbers 2n which are the result of the product of 2 with n (which is the product of known primes), are, also, the sum of two prime numbers which are equidistant from half the even number 2n. In every even number, all prime numbers ≤ 2n are known, and among these prime numbers there are prime numbers ≤ ½ 2n and prime numbers that are ≥ ½ 2n; the even number 2n is the combinatorics of prime numbers ≤ ½ 2n with prime numbers ≥ ½ 2n. The sum of the distances of a prime ≤ ½ 2n plus the sum of the distances of a prime ≥ ½ 2n equals 2n.

annex A ↑