On Goldbach conjecture
Stars and Bars(Combinatronics) and Partition(Number theory)
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Abstract:
On Goldbach conjecture stating that every number greater than 2 is the sum of 3 primes, and even integers is sum of 2 primes.

$\forall n \in \mathbb{Z}$, let assume all n (including primes) as well the sum can be written as 2a+1

$$a \Rightarrow \frac{(n-1)}{2}$$

let define:
$2a+1 \Rightarrow 2x+1$; as the sum
$2a+1 \Rightarrow 2a_k+1$;as the numbers of addends(tuples) { $2a_1+1, 2a_2+1, 2a_3+1, \ldots .2a_k+1$ }

By using the definition above we can formulate:

$$2a_1+1, 2a_2+1, 2a_3+1, \ldots .2a_k+1 \;=\; 2x+1$$

so we can rewrite the formula above as
$$2a_1+2a_2+2a_3+\ldots .+2a_k+k \;=\; 2x+1$$

example 1 (even integer sum):

$2a_1 = 7$; $\Rightarrow \frac{7-1}{2} \Rightarrow \frac{6}{2} \Rightarrow a=3$ $2a_2 = 11$; $\Rightarrow \frac{11-1}{2}$ 2x+1=18; k =2 $2a_1+2a_2+k \;=\; 2x+1$ $2(3)+2(5)+2 \;=\; 2x+1$ $2(3)+2(5)+1 \;=\; 2x$ $\frac{2(3)+2(5)+1}{2} \;=\; \frac{2x}{2}$ $\frac{17}{2}$ = x	$2a_1 = 2$; $\Rightarrow \frac{2-1}{2} \Rightarrow \frac{1}{2} \Rightarrow a=\frac{1}{2}$ $2a_2 = 5$; $\Rightarrow \frac{5-1}{2} \Rightarrow \frac{4}{2} \Rightarrow a=2$ $2a_3 = 7$; $\Rightarrow \frac{7-1}{2} \Rightarrow \frac{6}{2} \Rightarrow a=3$ 2x+1=14; k =3 $2a_1+2a_2+2a_3+k \;=\; 2x+1$ $2(\frac{1}{2})+2(2)+2(3)+3 \;=\; 2x+1$ $2(\frac{1}{2})+2(2)+2(3)+3-1 \;=\; 2x+1$ $2(\frac{1}{2})+2(2)+2(3)+2 \;=\; 2x$ $\frac{(13)}{2}$ = x

example 2 (odd integer sum):

$2a_1 = 1; \;\; \Rightarrow \frac{1-1}{2} \Rightarrow \frac{1}{2} \Rightarrow a=0$ $2a_2 = 7; \;\; \Rightarrow \frac{7-1}{2} \Rightarrow \frac{6}{2} \Rightarrow a=3$ $2a_3 = 11; \;\; \Rightarrow \frac{11-1}{2} \Rightarrow \frac{10}{2} \Rightarrow a=5$ 2x+1=19; k =3 $2a_1+2a_2+2a_3+k = 2x+1$ $2(0)+2(3)+2(5)+3 = 2x+1$ $0+6+10+3 = 2x+1$ $0+6+10+3-1 = 2x$ $\frac{(18)}{2} = x$	$2a_1 = 3; \;\; \Rightarrow \frac{3-1}{2} \Rightarrow \frac{2}{2} \Rightarrow a=1$ $2a_2 = 5; \;\; \Rightarrow \frac{5-1}{2} \Rightarrow \frac{4}{2} \Rightarrow a=2$ $2a_3 = 11; \;\; \Rightarrow \frac{11-1}{2} \Rightarrow \frac{10}{2} \Rightarrow a=5$ 2x+1=19; k =3 $2a_1+2a_2+2a_3+k = 2x+1$ $2(1)+2(2)+2(5)+3 = 2x+1$ $2+4+10+3 = 2x+1$ $2+4+10+3-1 = 2x$ $\frac{(18)}{2} = x$

thus we proved $\forall n \in \mathbb{Z}$ can be written as sum of 2 or more primes.
But the problem is checking $2a_k+1$ if prime because as defined above $\forall n \in \mathbb{Z}$ is equal to 2a+1 . So we need a primality test.

We can also prove this by using **y=-x+n.**
The addends on x and y axis intersect on the **y=-x+n** line. As shown below. So as **y=-x+n grows** the more addends we can use.