Theorem for distribution of prime pairs

Proof of Goldbach's conjecture, twin prime cinjecture

Let

$$A_n = a_1 n + a_2$$
$$B_n = b_1 n + b_2$$

A_n, B_n are not obviously composite like

$$A_n = n$$
$$B_n = n + 1$$

One of them is even

Theorem1

- $3^4 P ln^4 P$ -Consecutive A_n, B_n contains A_k, B_k that are prime at once when $A_n B_n < P^2$.

Proof of theorem1

For example

$$A_n = n$$
$$B_n = n + 2$$

(1,3)	(2,4)	(3,5)	(4,6)	(5,7)	(6,8)	(7,9)	(8,10)	(9,11)	(10,12)	⋯
·	2	·	2	·	2	·	2	·	2	⋯
3	·	3	3	·	3	3	·	3	3	⋯
·	·	5	·	5	·	·	5	·	5	⋯

√ √ √ √ √ √ √ √ √ √ √

For 11-consecutive $A_n B_n$

11 11 √ √ √ √ √ √ √ √ √ 11 11 √ √

15-consecutive $A_n B_n$ must contains 11 terms that are not divided by 11

$11 \cdot \frac{11+2}{11-2}$-consecutive $A_n B_n$ contains 11 terms that are not divided by 11.

11 11 √ √ √ √ √ √ √ √ √ 11 11 √ √

11 11 √ √ √ √ √ √ √ √ √ 11 11 √ √
7 7 · · · · · 7 7 · · · · · 7…

at
7 7 · · · · · 7 7 · · · · · 7…
insert
11 11 √ √ √ √ √ √ √ √ √ 11 11 √ √
7 7 11 11 √ √ √ 7 7 √ √ √ √ √ 7 7 √ 11 11 √ √ 7 7
Not longer than

$$11 \cdot \frac{11+2}{11-2} \cdot \frac{7+2}{7-2}$$

method1.

insert

√ √ √ √ √ √ √ √ √ √ √

into

11 11 · · · · · · · · · 11 11 · ·

7 7 · · · · · 7 7 · · · · ·

1,2,8,9,12,13th are already filled

7 7 √ √ √ √ √ 7 7 √ √ 11 11 √ 7 7 √ √ √

method2.

√ √ √ √ √ √ √ √ √ √ √

11 11 · · · · · · · · · 11 11 · ·

7 7 · · · · · 7 7 · · · · ·

Fill like method1.

7 7 √ √ √ √ √ 7 7 √ √ 11 11 √ 7 7 √ √ √

If 7 overlapped by 11, fill 11.

If 7 overlapped by ·, move last √ to there

7 7 11 11 √ √ √ 7 7 √ √ √ √ √ 7 7 √ 11 11 √ √ 7 7

It's longer than method1,

it's not longer than $11 \cdot \frac{11+2}{11-2} \cdot \frac{7+2}{7-2}$

Thus, $11 \cdot \frac{11+2}{11-2} \cdot \frac{7+2}{7-2}$ -consecutive A_nB_n has at least 11-not divided by 11 or 7

also

$11 \cdot \frac{11+2}{11-2} \cdot \frac{7+2}{7-2} \cdot \frac{5+2}{5-2} \cdot \frac{3+2}{3-2} \cdot \frac{2+1}{2-1}$ -consecutive A_nB_n has at least 11-not divided by 11,7,5,3,2.

and

$\mathrm{P} \cdot \frac{P+2}{P-2} \cdot \cdots \cdot \frac{5+2}{5-2} \cdot \frac{3+2}{3-2} \cdot \frac{2+1}{2-1}$ -consecutive A_nB_n has at least 11-not divided by prime less than P.

$$P \cdot \frac{P+2}{P-2} \cdot \cdots \cdot \frac{5+2}{5-2} \cdot \frac{3+2}{3-2} \cdot \frac{2+1}{2-1} < P \cdot \left(\frac{P}{P-1}\right)^4 \cdot \cdots \cdot \left(\frac{5}{5-1}\right)^4 \cdot \left(\frac{3}{3-1}\right)^4 \cdot \left(\frac{2}{2-1}\right)^4$$

We know that

$$\left(\frac{P}{P-1}\right) \cdot \cdots \cdot \left(\frac{5}{5-1}\right) \cdot \left(\frac{3}{3-1}\right) \cdot \left(\frac{2}{2-1}\right) < 3lnP$$

$$P \cdot \left(\frac{P}{P-1}\right)^4 \cdot \cdots \cdot \left(\frac{5}{5-1}\right)^4 \cdot \left(\frac{3}{3-1}\right)^4 \cdot \left(\frac{2}{2-1}\right)^4 < 3^4 Pln^4 P$$

hence $3^4 Pln^4 P$ -consecutive $A_n B_n$ has at least 11-not divided by prime less than P.

Goldbach's conjecture

$$A_n = n$$
$$B_n = 2N - n$$

$3\sqrt[4]{2N}\ln\sqrt[4]{2N}$ -consecutive A_n, B_n must contain A_k, B_k both are prime

Twin prime conjecture

$$A_n = n$$
$$B_n = n - 1$$

$3\sqrt[4]{n} ln \sqrt[4]{n}$ -consecutive A_n, B_n must contain A_k, B_k both are prime.

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