On The $d(x)=d(x+1)=d(x+2)=m$ Infinitely-often And $d(x)=d(x+2)=d(x+4)=m$ Infinitely-often

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Abstract: Using Jiang function we prove prime theorem on the $d(x)=d(x+1)=d(x+2)=m$ infinitely-often and $d(x)=d(x+2)=d(x+4)=m$ infinitely-often.

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Theorem 1.

$$d(x)=d(x+1)=d(x+2)=2 \text{ infinitely-often.} \quad (1)$$

where $d(x)$ represents the number of distinct prime factors of x, $d(x)=\sum_{P|x} 1, d(3)=1$, $d(15)=2$, $d(105)=3$.

Proof (see[1] p.146 theorem 3.1.154). Prime equations are

$$p_2=10p_1+1,\quad p_3=15p_1+2,\quad p_4=6p_1+1 \quad (2)$$

We have Jiang function

$$J_2(\omega)=3\prod_{7<P}(P-4)\neq 0, \quad (3)$$

where $\omega=\prod_{2\le P} P$

We prove that $J_2(\omega)\neq 0$ there exist infinitely many primes P_1 such that P_2, P_3, P_4 are primes.

We have asymptotic formula

$$\pi_4(N,2)=\left|\{P_1\le N:10P_1+1,15P_1+2,6P_1+1\}\right|\sim\frac{J_2(\omega)\omega}{\phi^4(\omega)}\frac{N}{\log^4 N}, \quad (4)$$

where $\phi(\omega)=\prod_{2\le P}(P-1)$.

From (2) we have $3p_2+1=30p_1+4=2p_3$, $3p_2+2=30p_1+5=5p_4$. $3p_2$, We prove that there exist infinitely many triples of consecutive integers, each being the products of two distinct primes.

Theorem 2.

$$d(x)=d(x+1)=d(x+2)=m>1 \text{ infinitely-often} \quad (5)$$

Proof (see [1] p.148, theorem 3.1.158). Suppose that $u, u+1$ and $u+2$ are three consecutive integers, each being the products of $m-1$ distinct primes. Let $M=u(u+1)(u+2)$. We define the three prime equations

$$P_2=\frac{2M}{u}P_1+1,\quad P_3=\frac{2M}{u+1}P_1+1,\quad P_4=\frac{2M}{u+2}P_1+1 \qquad (6)$$

Using Jiang function $J_2(\omega)$ we prove that there exist infinitely many primes P_1 such that P_2, P_3 and P_4 are primes.

From (6) we have

$$uP_2=2MP_1+u,\quad uP_2+1=2MP_1+u+1=(u+1)\left(\frac{2M}{u+1}P_1+1\right)=(u+1)P_3$$

$$uP_2+2=2MP_1+u+2=(u+2)\left(\frac{2M}{u+2}P_1+1\right)=(u+2)P_4$$

We prove

$d(uP_2)=d(uP_2+1)=d(uP_2+2)=m$ infinitely-often. (7)

Theorem 3.

$d(x)=d(x+2)=d(x+4)=2$ infinitely-often (8)

Proof [1,2,3]. Prime equations are

$$P_2=70P_1+1,\quad P_3=42P_1+1,\quad P_4=30P_1+1 \qquad (9)$$

Using Jiang function $J_2(\omega)$ we prove that there exist infinitely many primes P_1 such that P_2, P_3 and P_4 are primes.

Frome (9) we have

$$3P_2=210P_1+3,\quad 3P_2+2=210P_1+5=5(42P_1+1)=5P_3$$

$$3P_2+4=210P_1+7=7(30P_1+1)=7P_4 \qquad (10)$$

We prove

$d(3P_2)=d(3P_2+2)=d(3P_2+4)=2$ infinitely-often. (11)

Theorem 4.

$d(x)=d(x+2)=d(x+4)=m>1$ infinitely-often. (12)

Proof [1, 2, 3]. Suppose that $u, u+2$ and $u+4$ are three odd integers, each being the products of $m-1$ distinct primes. Let $M=u(u+2)(u+4)$

We define three prime equations

$$P_2=\frac{2M}{u}P_1+1,\quad P_3=\frac{2M}{u+2}P_1+1,\quad P_4=\frac{2M}{u+4}P_1+1 \qquad (13)$$

Using Jiang function $J_2(\omega)$ we prove that there exist infinitely many primes P_1 such that P_2, P_3 and P_4 are primes.

From (13) we have $uP_2=2MP_1+u$,

$$uP_2+2=2MP_1+u+2=(u+2)\left(\frac{2M}{u+2}P_1+1\right)=(u+2)P_3,$$

$$uP_2+4=MP_1+u+4=(u+4)\left(\frac{2M}{u+4}P_1+1)\right)=(u+4)P_4. \qquad (14)$$

We prove

$d(uP_2)=d(uP_2+2)=d(uP_2+4)=m$ infinitely often. (15)

Using Jiang function $J_2(\omega)$ we are able to prove

$d(x) = d(x+n) = m > 1$ infinitely-often. (16)

$d(x) = d(x+5-3) = d(x+7-3) = \cdots = d(x+P-3) = m > 1$ infinitely-often. (17)

Goldston *et. al* prove only $d(x) = d(x+n \le 6) = 2$ infinitely-often [4].

References

1. Chun-Xuan Jiang, Foundations of Santilli's isonumber theory with applicatio applications to new cryptograms, Fernat's theorem and Goldbach's conjecture. Inter. Acad. Press, 2002, MR2004c:11001, (http://www.i-b-r.org/docs/jiang.pdf) (http://www.wbabin.net/math/xuan13. pdf).
2. Chun-Xuan Jiang, on the consecutive integers $n+i-1=(i+1)P_i$, (http:// www. wbabin.net /math/xuan40.pdf).
3. Chun-Xuan Jiang, Jiang's funciton $J_{n+1}(\omega)$ in prime distribution. (http:// www. wbabin. net/ math/ xuan2. pdf).
4. D. A. Goldston, S. W. Graham, J. Pintz and C. Y. Yildirim, Small gaps between products of two primes, Proc. London Math. Soc, (3) 98 (2009) 741-774.

Some descriptions by Chinese:

我们发现素数分布新的规律，这个问题比哥德巴赫猜想要难一万倍。最近国际顶尖数学家正在研究这个问题。得到国际数学界广泛的支持和关注，但文章都发表在著名杂志上，但没有得出任何实质性进展，蒋春暄在 2002 年[1]就彻底证明了它，但国内外数学家都读了它，都不说话，看到文献[4]后，我们决定写本文，如不用 Jiang 函数，再过两百年也不一定能证明它，国内更无人研究它，这才是研究方向！

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