New prime *k*-tuple theorem（17）

$$P, P^{P_0} + j(j+1)(j = 1, \cdots, k)$$

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Abstract: Using Jiang function we prove for any k there are infinitely many primes P such that each of $P^{P_0} + j(j+1)$ is a prime.

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Theorem . Let P_0 be an odd prime.

$$P, P^{P_0} + j(j+1)(j = 1, \cdots, k) \qquad (1)$$

For any k there are infinitely many primes P such that each of $P^{P_0} + j(j+1)$ is a prime.

Proof. we have Jiang function [1,2]

$$J_2(\omega) = \prod_P [P - 1 - \chi(P)] \qquad (2)$$

where $\omega = \prod_P P$. $\chi(P)$ is the number of solutions of congruence

$$\prod_{j=1}^{k} \left[q^{P_0} + j(j+1) \right] \equiv 0 \pmod{P}, q = 1, \cdots, P-1 \qquad (3)$$

From (2) and (3) we have

$$J_2(\omega) \neq 0 \qquad (4)$$

We prove that there are infinitely may primes P such that each of $P^{P_0} + j(j+1)$ is a prime.
We have asymptotic formula [1,2]

$$\pi_{k+1}(N,2) = \left| \left\{ P \le N : P^{P_0} + j(j+1) = prime \right\} \right| \sim \frac{J_2(\omega)\omega^k}{(P_0)^k \phi^{k+1}(\omega)} \frac{N}{\log^{k+1} N} \qquad (5)$$

Remark. The prime number theory is basically to count the Jiang function $J_{n+1}(\omega)$ and Jiang prime k-tuple singular series $\sigma(J) = \frac{J_2(\omega)\omega^{k-1}}{\phi^k(\omega)} = \prod_P \left(1 - \frac{1+\chi(P)}{P} \right) (1 - \frac{1}{P})^{-k}$ [1,2], which can count the number of prime number. The prime distribution is not random. But Hardy prime k -tuple singular series $\sigma(H) = \prod_P \left(1 - \frac{\nu(P)}{P} \right) (1 - \frac{1}{P})^{-k}$ is false [3-8], which cannot count the number of prime numbers. The prime is not a random variable. Probabilistic number theory is false.

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Szemerédi's theorem does not directly to the primes, because it can not count the number of primes. It is unusable. Cramér's random model can not prove prime problems. It is incorrect. The probability of $1/\log N$ of being prime is false. Assuming that the events "P is prime", "$P+2$ is prime" and "$P+4$ is prime" are independent, we conclude that P, $P+2$, $P+4$ are simultaneously prime with probability about $1/\log^3 N$. There are about $N/\log^3 N$ primes less than N. Letting $N\to\infty$ we obtain the prime conjecture, which is false. The tool of additive prime number theory is basically the Hardy-Littlewood prime tuple conjecture, but can not prove and count any prime problems[6].

Mathematicians have tried in vain to discover some order in the sequence of prime numbers but we have every reason to believe that there are some mysteries which the human mind will never penetrate.

Leonhard Euler(1707-1783)

It will be another million years, at least, before we understand the primes.

Paul Erdos(1913-1996)