The distribution of prime numbers

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Abstract. In this paper, we discovered a new sequence of prime numbers, every term of this sequence is either a prime number or equal to 1.

Keywords. Prime numbers, sequence, Rowland sequence.

1. Introduction

A number is said to be a prime number if the number is divisible by 1 and itself; otherwise it's composite.

The distribution of prime numbers which was treated in many researches. The Rowland sequence of prime numbers compose entirely of 1's and primes, the sequence defined by the recurrence relation

$$r(n) = r(n-1) + \gcd(n, r(n-1)); \quad r(1) = 1$$

The sequence of differences $r(n+1) - r(n)$

1, 1, 1, 5, 3, 1, 1, 1, 1, 11, 3, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 23, 3, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,1, 1, 1, 47, 3, 1, 5, 3, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 101, 3, 1, 1, 7, 1, 1, 1, 1, 11, 3, 1, 1, 1, 1, 1, 13, 1, 1, 1, 1, 1, 1, 1, 1, 1,..

(sequence A132199 in the OEIS).

In this paper, we present a New way to generate the distribution of prime numbers.

2. The sequence of $b(n)$ and $a(n)$

The sequence $b(n)$ satisfy the following recursive formula

$$b(n) = (n-1)b(n-1) - nb(n-2); \; n \geq 3$$

With the starting conditions $b(3) = 1$, and $b(4) = 7$.

The first few values of b(n).

b(n)={1, 7, 23, 73, 277, 1355, 8347, 61573, 523913,..}

In this section, we present our sequence of prime numbers defined in the conjecture as follows.

Conjecture 2.1. The sequence $a(n)$ of the prime numbers satisfy the following formula

$$a(n) = \frac{n^2 - n - 1}{gcd(b(n),\ n^2 - n - 1)}\ ;\ for\ n \geq 3$$

Where gcd(x, y) denotes the greatest common divisor of x and y.

The values of $a(n)$.

5, 11, 19, 29, 41, 11, 71, 89, 109, 131, 31, 181, 19, 239, 271, 61, 31, 379, 419, 461, 101, 29, 599, 59, 701, 151, 811, 79, 929, 991, 211, 59, 41, 1259, 1, 281, 1481, 1559, 149, 1721, 1, 61, 1979, 2069, 2161, 1, 2351, 79, 2549, 241, 1, 2861, 2969, 3079, 3191,…

Conjecture 2.2. every term of this sequence is either a prime number or equal to 1.

References

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(Concerned with the sequence A132199)