An interesting property shared by a set of primes

Marius Coman
Bucuresti, Romania
email: mariuscoman13@gmail.com

Abstract. In this paper I present a property of a set of primes, interesting not because it has a value for distinguish primes from odd composites, because there are such numbers which also have this property, but because it seems to split the set of primes into two classes – the primes that have this property and the primes that have not this property – containing primes in surprisingly equal proportion.

Note:

We name the primes p that have the property that can be written as p = m*s – m + 1, where s is the sum of their digits and m is a non-null positive integer, primes of class I and the primes that haven't it primes of class II.

Example:

: 19 is a prime of class I because it can be written as 19 = m*s – m + 1, where s = 10 and m = 2;

: 23 is a prime of class II because it can't be written as 23 = m*5 – m + 1, where m non-null positive integer.

Conjecture:

Given any positive integer N large enough (probably the condition that N > 78 is sufficient), let a be the number of primes of the class I less than or equal to N and b the number of primes of the class II less than or equal to N; let also be r the largest value from a/b and b/a; then r < 2.

Primes of class I:

(that have this property)
2, 3, 5, 7, 11, 13, 19, 31, 37, 41, 43, 61, 71, 73, 101, 103, 113, 127, 137, 151, 157, 163, 181, 191, 193, 199, 211, 223, 229, 239, 241, 271, 281 (...).

The corresponding values of m:
1, 1, 1, 1, 10, 4, 2, 10, 4, 10, 7, 10, 10, 8, 100, 34, 16, 14, 34, 7, 13, 18, 20, 19, 16, 11, 70, 37, 19, 40, 30, 28 (...).

Primes of class II:

(that have not this property)
17, 23, 29, 47, 53, 59, 67, 79, 83, 89, 97, 107, 109, 131, 139, 149, 167, 173, 179, 197, 227, 233, 239, 251, 257, 263, 269, 277, 283, 293 (...).

Observation:

It can be seen that, for N = 100, r = 14/11; for N = 200, r = 26/20; for N = 300, r = 33/30.

Note:

Interesting classes of primes can be formed based on this property; such a class contains the primes p that can be written as p = s^2 – s + 1, where s is the sum of their digits; such primes are: 13, 43, 151, 157 (...).