A possible way to write any prime, using just another prime and the powers of the numbers 2, 3 and 5

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

Abstract. In this paper I make a conjecture which states that any odd prime can be written in a certain way, in other words that any such prime can be expressed using just another prime and the powers of the numbers 2, 3 and 5. I also make a related conjecture about twin primes.

Conjecture:

Any odd prime p can be written at least in one way as p = (q*2^a*3^b*5^c ± 1)*2^n ± 1, where q is an odd prime or is equal to 1, where a, b and c are non-negative integers and n is non-null positive integer.

Verifying the conjecture:
(For the first five odd primes)

: 3 = (1*2^1*3^0*5^0 – 1)*2^1 + 1, but also 3 = (1*2^0*3^1*5^0 – 1)*2^1 - 1;

: 5 = (1*2^1*3^0*5^0 + 1)*2^1 - 1, but also 5 = (1*2^0*3^1*5^0 – 1)*2^1 + 1, also 5 = (1*2^2*3^0*5^0 - 1)*2^1 - 1;

: 7 = (1*2^0*3^1*5^0 + 1)*2^1 - 1, but also 7 = (1*2^1*3^0*5^0 + 1)*2^1 + 1, also 7 = (3*2^0*3^0*5^0 + 1)*2^1 – 1, also 7 = (5*2^0*3^0*5^0 - 1)*2^1 – 1, also 7 = (1*2^2*3^0*5^0 - 1)*2^1 + 1;

: 11 = (1*2^1*3^1*5^0 - 1)*2^1 + 1, but also 11 = (1*2^0*3^0*5^1 + 1)*2^1 - 1, also 11 = (3*2^1*3^0*5^0 - 1)*2^1 + 1, also 11 = (5*2^0*3^0*5^0 + 1)*2^1 – 1, also 11 = (7*2^0*3^0*5^0 - 1)*2^1 – 1, also 11 = (1*2^2*3^0*5^0 + 1)*2^1 + 1;

: 13 = (1*2^1*3^1*5^0 + 1)*2^1 + 1, but also 13 = (1*2^0*3^0*5^1 + 1)*2^1 + 1, also 13 = (3*2^1*3^0*5^0 + 1)*2^1 + 1, also 13 = (5*2^0*3^0*5^0 + 1)*2^1 + 1, also 13 = (7*2^0*3^0*5^0 - 1)*2^1 + 1.

Conjecture:

Any pair of twin primes [p_1, p_2] can be written as [p_1 = (q*2^a*3^b*5^c ± 1)*2^n - 1, p_2 = (q*2^a*3^b*5^c ± 1)*2^n + 1], where q is prime or is equal to 1, where a, b and c are non-negative integers and n is non-null positive integer.

Verifying the conjecture:
(For the first three pairs of twin primes)

: 3 = (1*2^0*3^1*5^0 – 1)*2^1 - 1 and
5 = (1*2^0*3^1*5^0 – 1)*2^1 + 1;

: 5 = (1*2^1*3^0*5^0 + 1)*2^1 - 1 and
7 = (1*2^1*3^0*5^0 + 1)*2^1 + 1, also

5 = (1*2^2*3^0*5^0 - 1)*2^1 – 1 and
7 = (1*2^2*3^0*5^0 - 1)*2^1 + 1;

: 11 = (1*2^0*3^0*5^1 + 1)*2^1 – 1 and
13 = (1*2^1*3^1*5^0 + 1)*2^1 + 1, also

11 = (5*2^0*3^0*5^0 + 1)*2^1 – 1 and
13 = (5*2^0*3^0*5^0 + 1)*2^1 + 1.