Five conjectures on a diophantine equation involving two primes and a square of prime

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

Abstract. In this paper I make five conjectures about the primes r, t and the square of prime p^2, which appears as solutions in the diophantine equation 120*n*q*r + 1 = p^2, where n is non-null positive integer.

Conjecture 1:

For any n non-null positive integer there exist q, r primes such that 120*n*q*r + 1 = p^2, where p is prime or a power of prime.

Conjecture 2:

For any q odd prime there exist n non-null positive integer and r prime such that 120*n*q*r + 1 = p^2, where p is prime or a power of prime.

Conjecture 3:

For any q, r odd primes there exist n non-null positive integer such that 120*n*q*r + 1 = p^2, where p is prime or a power of prime.

Conjecture 4:

For any n non-null positive integer and any q prime there exist r prime such that 120*n*q*r + 1 = p^2, where p is prime or a power of prime.

Examples:

: For [n, q] = [1, 5] there exist r = 17 such that p = 101 prime; also r = 37 such that p = 149 prime;
: For [n, q] = [1, 7] there exist r = 23 such that p = 139 prime; also r = 53 such that p = 211 prime;
: For [n, q] = [1, 11] there exist r = 13 such that p = 131 prime; also r = 83 such that p = 331 prime;

: For [n, q] = [2, 5] there exist r = 19 such that p = 151 prime;

: For [n, q] = [2, 7] there exist r = 3 such that p = 71 prime; also r = 17 such that p = 169 square of prime;
: For [n, q] = [2, 11] there exist r = 3 such that p = 89 prime;

: For [n, q] = [3, 7] there exist r = 13 such that p = 181 prime;
: For [n, q] = [3, 11] there exist r = 3 such that p = 109 prime;

: For [n, q] = [4, 5] there exist r = 67 such that p = 401 prime;
: For [n, q] = [4, 7] there exist r = 17 such that p = 239 prime;
: For [n, q] = [4, 11] there exist r = 11 such that p = 241 prime.

Conjecture 5:

For any n non-null positive integer there exist q prime such that 120*n*q^2 + 1 = p^2, where p is prime or a power of prime.
Note, for instance, the case from the examples below: 480*11^2 + 1 = 241^2.