# Two conjectures about the pairs of primes separated by a certain distance

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

**Abstract.** In this paper I make two conjectures abut the pairs of primes [p1, q1], where the difference between p1 and q1 is a certain even number d. I state that any such pair has at least one other corresponding, in a specified manner, pair of primes [p2, q2], such that the difference between p2 and q2 is also equal to d.

**Conjecture 1:**

For any pair of primes, greater than 3, $[p_1, q_1]$, where $q_1 - p_1 = d$, there exist at least a pair of positive integers [m, n], where $n - m = d$, such that the numbers $p_2 = p_1*q_1 - n + 1$ and $q_2 = p_1*q_1 - m + 1$ are both primes.

**Examples:**

: For $[p_1, q_1] = [5, 7]$ there exist the pair [m, n] = [5, 7] such that $p_2 = 5*7 - 7 + 1 = 29$ and $q_2 = 5*7 - 5 + 1 = 31$ are both primes;

: For $[p_1, q_1] = [5, 11]$ there exist the pair [m, n] = [3, 9] such that $p_2 = 5*11 - 9 + 1 = 47$ and $q_2 = 5*11 - 3 + 1 = 53$ are both primes;

: For $[p_1, q_1] = [5, 13]$ there exist the pair [m, n] = [5, 13] such that $p_2 = 5*13 - 13 + 1 = 53$ and $q_2 = 5*13 - 5 + 1 = 61$ are both primes;

: For $[p_1, q_1] = [7, 11]$ there exist the pair [m, n] = [7, 11] such that $p_2 = 7*11 - 11 + 1 = 67$ and $q_2 = 7*11 - 7 + 1 = 71$ are both primes;

: For $[p_1, q_1] = [7, 13]$ there exist the pair [m, n] = [7, 11] such that $p_2 = 7*11 - 11 + 1 = 67$ and $q_2 = 7*11 - 7 + 1 = 71$ are both primes;

: For $[p_1, q_1] = [11, 13]$ there exist the pair [m, n] = [5, 7] such that $p_2 = 11*13 - 5 + 1 = 137$ and $q_2 = 11*13 - 7 + 1 = 139$ are both primes.

**Conjecture 2:**

For any even number d there exist an infinity of pairs of primes $[p_1, q_1]$, where $q_1 - p_1 = d$, such that the numbers $p_2 = p_1*q_1 - p_1 + 1$ and $q_2 = p_1*q_1 - q_1 + 1$ are both primes.

Note: See, for instance, from the examples to the Conjecture 1 from above, the pair [5, 7] for d = 2, the pair [7, 11] for d = 4, the pair [5, 13] for d = 8.