Five conjectures on primes based on the observation of Poulet and Carmichael numbers

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Abstract. In this paper I enunciate five conjectures on primes, based on the study of Fermat pseudoprimes and on the author's believe in the importance of multiples of 30 in the study of primes.

Conjecture 1:

For any p, q distinct primes, p > 30, there exist n positive integer such that p – 30*n and q + 30*n are both primes.

Note:

This conjecture is based on the observation of 2-Poulet numbers (see my paper "A conjecture about 2-Poulet numbers and a question about primes").

Conjecture 2:

For any p, q, r distinct primes there exist n positive integer such that the numbers 30*n – p, 30*n – q and 30*n – r are all three primes.

Note:

This enunciation is obviously equivalent to the enunciation that there exist m such that p + 30*m, q + 30*m and r + 30*m are all three primes (take x = 30*n – p, y = 30*n – q and z = 30*n – r. Then there exist k such that 30*k – 30*n + p, 30*k – 30*n + q and 30*k – 30*n + r are all three primes).

Note:

This conjecture implies of course that for any pair of twin primes (p, q) there exist a pair of primes (30*n – p, 30*n – q) so that there are infinitely many pairs of twin primes.

Note:

This conjecture is based on the observation of 3-Carmichael numbers (see my paper "A conjecture about primes based on heuristic arguments involving Carmichael numbers).

Conjecture 3:

There exist an infinity of pairs of distinct primes (p, q), where p < q, both of the same form from the following eight ones: 30*k + 1, 30*k + 7, 30*k + 11, 30*k + 13, 30*k + 17, 30*k + 19, 30*k + 23 and 30*k + 29 such that the number p*q + (q - p) is prime.

Note:

This conjecture is based on the observation of Carmichael numbers.

Examples:

: 31*151 + (151 – 31) = 4801 prime;
: 37*127 + (127 – 37) = 4789 prime;
: 41*101 + (101 – 41) = 4201 prime;
: 13*103 + (103 – 13) = 1429 prime;
: 17*47 + (47 – 17) = 829 prime;
: 19*109 + (109 – 19) = 2161 prime;
: 23*53 + (53 – 23) = 1249 prime.

Conjecture 4:

There exist an infinity of pairs of distinct primes (p, q), where p < q, both of the same form from the following eight ones: 30*k + 1, 30*k + 7, 30*k + 11, 30*k + 13, 30*k + 17, 30*k + 19, 30*k + 23 and 30*k + 29 such that the number p*q - (q - p) is prime.

Note:

This conjecture is based on the observation of Carmichael numbers.

Examples:

: 31*61 – (61 – 31) = 1861 prime;
: 7*37 – (37 – 7) = 229 prime;
: 11*41 – (41 – 11) = 421 prime;
: 13*73 – (73 – 13) = 919 prime;
: 17*47 – (47 – 17) = 769 prime;
: 19*139 - (139 – 19) = 2521 prime;
: 23*293 - (293 – 23) = 6469 prime.

Conjecture 5:

For any p prime there exist an infinity of primes q, q > p, where p and q are both of the same form from the following eight ones: 30*k + 1, 30*k + 7, 30*k + 11, 30*k + 13, 30*k + 17, 30*k + 19, 30*k + 23 and 30*k + 29 such that the number p*q - (q - p) is prime.