Primes of the form p]c[x]c[q]c[y]c[r where p, q, r consecutive primes, q-p=x and r-q=y

Abstract. In this paper I make the following two conjectures: (I) there exist an infinity of triplets of consecutive primes [p, q, r] such that the number obtained concatenating p with x then with q then with y then with r, where x is the gap between p and q and y the gap between q and r, is prime. In other words, if we use the operator "]c[" with the meaning "concatenating to", p]c[x]c[q]c[y]c[r is prime for an infinity of triplets [p, q, r]. Example: for [p, q, r, x, y] = [11, 13, 17, 2, 4] the number 11213417 is prime; (II) for any pair of consecutive primes [p, q], p ≥ 7, there exist an infinity of primes r such that the number n = p]c[x]c[q]c[y]c[r is prime, where x is the gap between p and q and y the gap between q and r. Example: for [p, q] = [13, 17] there exist r = 61 such that n = 134174461 is prime (x = 4 and y = 44).

Conjecture 1:

There exist an infinity of triplets of consecutive primes [p, q, r] such that the number n obtained concatenating p with x then with q then with y then with r, where x is the gap between p and q and y the gap between q and r, is prime. In other words, if we use the operator "]c[" with the meaning "concatenating to", p]c[x]c[q]c[y]c[r is prime for an infinity of triplets [p, q, r]. Example: for [p, q, r, x, y] = [11, 13, 17, 2, 4] the number 11213417 is prime.

The sequence of primes n:

: 527411, 7411213, 11213417, 61667471, 73679483, 10121034107, 10721094113, 139101492151, 181101912193, 23362392241, 26362692271, 313431714331, 38983974401, 409104192421, 46124634467 (...)

obtained for [p, q, r] = [5, 7, 11], [7, 11, 13], [11, 13, 17], [61, 67, 71], [73, 79, 83], [101, 103, 107], [107, 109, 113], [139, 149, 151], [181, 191, 193], [233, 239, 241], [263, 269, 271], [313, 317, 331], [389, 397, 401], [409, 419, 421], [461, 463, 467]...

respectively for [x, y] = [2, 4], [4, 2], [2, 4], [6, 4], [6, 4], [2, 4], [2, 4], [10, 2], [10, 2], [6, 2], [6, 2], [4, 14], [8, 4], [10, 2], [2, 4]...

Conjecture 2:

For any pair of consecutive primes [p, q], p ≥ 7, there exist an infinity of primes r such that the number n = p]c[x]c[q]c[y]c[r is prime, where x is the gap between p and q and y the gap between q and r. Example: for [p, q] = [13, 17] there exist r = 61 such that n = 134174461 is prime (x = 4 and y = 44).

The sequence of primes n for [p, q] = [7, 11]:

: 7411213, 741198109, 7411128139, 7411146157 (...)

obtained for r = 13, 109, 139, 157...

respectively for [x, y] = [4, 2], [4, 98], [4, 128], [4, 146]...

The sequence of primes n for [p, q] = [11, 13]:

: 11213417, 112131629, 112133447, 112134053 (...)

obtained for r = 17, 29, 47, 53...

respectively for [x, y] = [2, 4], [2, 16], [2, 34], [2, 40]...

The sequence of primes n for [p, q] = [13, 17]:

: 134174461, 134175673, 134176279, 134178097 (...)

obtained for r = 61, 73, 79, 97...

respectively for [x, y] = [4, 44], [4, 56], [4, 62], [4, 80]...

The least prime n for the next few pairs of [p, q]:

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:  n = 172193453   and r = 53   for [p, q] = [17, 19];
:  n = 1942380103  and r = 103  for [p, q] = [19, 23];
:  n = 236293867   and r = 67   for [p, q] = [23, 29];
:  n = 29231136167 and r = 167  for [p, q] = [29, 31];
:  n = 31637226263 and r = 263  for [p, q] = [31, 37];
:  n = 376431659   and r = 59   for [p, q] = [37, 43];
:  n = 434472067   and r = 67   for [p, q] = [43, 47];
:  n = 53659867    and r = 67   for [p, q] = [53, 59];
:  n = 59261166227 and r = 227  for [p, q] = [59, 61];
:  n = 61667471    and r = 71   for [p, q] = [61, 67];
:  n = 6747168139  and r = 139  for [p, q] = [67, 71];
:  n = 712731083   and r = 83   for [p, q] = [71, 73].
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