The property of Poulet numbers to create through concatenation semiprimes which are c-primes or m-primes

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Abstract. In this paper I present a very interesting characteristic of Poulet numbers, namely the property that, concatenating two of such numbers, is often obtained a semiprime which is either c-prime or m-prime. Using just the first 13 Poulet numbers are obtained 9 semiprimes which are c-primes, 20 semiprimes which are m-primes and 9 semiprimes which are cm-primes (both c-primes and m-primes).

Observation:

Concatenating two Poulet numbers, is often obtained a semiprime which is either c-prime or m-prime.

The sequence of Poulet numbers:
(A001567 in OEIS)

341, 561, 645, 1105, 1387, 1729, 1905, 2047, 2465, 2701, 2821, 3277, 4033, 4369, 4371, 4681, 5461, 6601, 7957, 8321, 8481, 8911, 10261, 10585, 11305, 12801, 13741, 13747, 13981, 14491, 15709, 15841, 16705, 18705, 18721, 19951, 23001, 23377, 25761, 29341 (...)

There are obtained, using just the first 13 terms from this sequence:

Nine semiprimes which are c-primes:

: 1105561 = 17*65033 is c-prime because 65033 – 17 + 1 = 65017 = 79*823 and 823 – 79 + 1 = 745 = 5*149 and 149 – 5 + 1 = 145 = 5*29 and 29 – 5 + 1 = 25 = 5*5 and 5 – 5 + 1 = 1, c-prime by definition);

: 1387561 = 7*198223 is c-prime because 198223 – 7 + 1 = 198217 = 379*523 and 523 – 379 + 1 = 145 = 5*29 and 29 – 5 + 1 = 25 = 5*5 and 5 – 5 + 1 = 1, c-prime by definition);

: 5611729 = 73*76873 is c-prime because 76873 – 73 + 1 = 76801, prime;
: 5614033 = 643*8731 is c-prime because 8731 – 643 + 1 = 8089, prime;

: 4033561 = 7*576223 is c-prime because 576223 – 7 + 1 = 576217, prime;

: 6451729 = 571*11299 is c-prime because 11299 – 571 + 1 = 10729, prime;

: 6452701 = 1559*4139 is c-prime because 4139 – 1559 + 1 = 2581 = 29*89 and 89 – 29 + 1 = 61, prime;

: 6454033 = 17*379649 is c-prime because 379649 – 17 + 1 = 25379633, prime;

: 19051105 = 5*3810221 is c-prime because 3810221 – 5 + 1 = 3810217 = 587*6491 and 6491 – 587 + 1 = 5905 = 5*1181 and 1181 – 5 + 1 = 1177 = 11*107 and 107 – 11 + 1 = 97, prime.

: Note that the following numbers are also c-primes: 17293277 (with c-reached prime 22277).

Twenty semiprimes which are m-primes:

: 341561 = 11*31051 is m-prime because 31051 + 11 – 1 = 31061 = 89*349 and 89 + 349 – 1 = 437 = 19*23 and 19 + 23 – 1 = 41, prime;

: 561341 = 11*51031 is m-prime because 51031 + 11 – 1 = 51041 = 43*1187 and 1187 + 43 – 1 = 1229, prime;

: 341645 = 5*68329 is m-prime because 68329 + 5 – 1 = 68333 = 23*2971 and 23 + 2971 – 1 = 2993 = 41*73 and 41 + 73 – 1 = 103, prime;
: 1105341 = 3*368447 is m-prime because 368447 + 3 – 1 = 368449 = 607^2 and 607 + 607 – 1 = 1213, prime;

: 1905341 = 251*7591 is m-prime because 7591 + 251 – 1 = 7841, prime;

: 5611387 = 337*16651 is m-prime because 16651 + 337 – 1 = 16987, prime;

: 2701561 = 43*62827 is m-prime because 62827 + 43 – 1 = 62869, prime;

: 2047645 = 5*409529 is m-prime because 409529 + 5 – 1 = 409533 = 3*136511 and 136511 + 3 - 1 = 136513 = 13*10501 and 10501 + 13 – 1 = 10513, prime.

: Note that the following numbers are also m-primes: 13871729 (with m-reached prime 113), 28211387 (with m-reached prime 57947), 17292701 (with m-reached prime 17), 32771729 (with m-reached prime 16349), 17294033 (with m-reached prime 1181), 40331729 (with m-reached prime 17), 19052047 (with m-reached prime 2721727), 19052465 (with m-reached prime 3810497), 20472701 (with m-reached prime 15809), 27012047 (with m-reached prime 2399), 27012821 (with m-reached prime 27013277), 40333277 (with m-reached prime 14657).

Nine semiprimes which are cm-primes (both c-primes and m-primes):

: 645341 = 97*6653 is cm-prime because is c-prime (6653 – 97 + 1 = 6557 = 79*83 and 83 – 79 + 1 = 5, prime) and is m-prime (653 + 97 – 1 = 6749 = 17*397 and 17 + 397 – 1 = 413 = 7*59 and 7 + 59 – 1 = 65 = 5*13 and 5 + 13 – 1 = 17, prime);

: 2465341 = 1237*1993 is cm-prime because is c-prime (1993 – 1237 + 1 = 757, prime) and is m-prime (1993 + 1237 – 1 = 3229, prime);

: 1729561 = 523*3307 is cm-prime because is c-prime (3307 – 523 + 1 = 2785 = 5*557 and 557 – 5 + 1 = 553 = 7*79 and 79 – 7 + 1 = 73, prime) and is m-prime (3307 + 523 – 1 = 3829 = 7*547 and 7 + 547 – 1 = 553 = = 7*79 and 79 – 7 + 1 = 73, prime); note that, in the case of this number, the c-reached prime is equal to the m-reached prime (two such special numbers like 561, the first absolute Fermat pseudoprime, and 1729, the Hardy-Ramanujan number, could only hace a special behaviour);

: 2047561 = 1327*1543 is cm-prime because is c-prime (1543 – 1327 + 1 = 217 = 7*31 and 31 – 7 + 1 = 25 = 5*5, square of prime) and is m-prime (1543 + 1327 – 1 = 2869 = 19*151 and 151 + 19 – 1 = 169 = 13*13 and 13 + 13 – 1 = 25 = 5*5 and 5 + 5 – 1 = 9 = 3*3 and 3 + 3 – 1 = 5, prime);

: 5612701 = 2011*2791 is cm-prime because is c-prime (2791 – 2011 + 1 = 781 = 1*71 and 71 – 11 + 1 = 61, prime) and is m-prime (2791 + 2011 – 1 = 4801, prime);

: 5612821 = 151*37171 is cm-prime because is c-prime (37171 – 151 + 1 = 37021, prime) and is m-prime (37171 + 151 – 1 = 37321, prime);

: 11051729 = 13*850133 is cm-prime because is c-prime (850133 – 13 + 1 = 850121, prime) and is m-prime (850133 + 13 – 1 = 850145 = 5*170029 and 170029 + 5 - 1 = 170033 = 193*881 and 881 + 193 – 1 = 1073 = 29*37 and 29 + 37 – 1 = 65 = 5*13 and 5 + 13 – 1 = 17, prime).

: Note that the following numbers are also cm-primes: 11053277 (with c-reached prime 1277 and m-reached prime 41057), 19051729 (with c-reached prime 1 and m-reached prime 12589).