Sets of primes distinguished among the terms of twenty Smarandache concatenated sequences

Abstract. In this paper I list a number of 20 Smarandache concatenated sequences (for other lists and analyses on these sequences see "Smarandache Sequences" on Wolfram MathWorld and "The math encyclopedia of Smarandache type notions", Educational Publishing, 2013) and I highlight the sets of primes distinguished among the terms of these sequences, but also I list 25 "sets of primes which can be obtained from the terms of Smarandache sequences using any arithmetical operation" (I named such primes Smarandache-Coman sequences of primes, see my previous papers "Fourteen Smarandache-Coman sequences of primes" and "Seven Smarandache-Coman sequences of primes").

I.

The consecutive numbers sequence

S(n) is defined as the sequence obtained through the concatenation of the first n positive integers.

The first ten terms of the sequence (A007908 in OEIS):
1, 12, 123, 1234, 12345, 123456, 1234567, 12345678, 123456789, 12345678910.

There is not even a prime known among the terms of this sequence, though there have been checked the first about 40 thousand terms.

1. Smarandache-Coman sequence

I shall use the notation a(n) for a term of a Smarandache concatenated sequence and b(n) for a term of a Smarandache-Coman sequence.

SC(n) is defined as follows: b(n) = a(n+1) – a(n) – 2 if the last digit of the term a(n+1) is even and b(n) = a(n+1) - a(n) + 2 if the last digit of the term a(n+1) is odd.

The first seven terms of SC(n) (primes by definition):
113, 1109, 11113, 111109, 111111113, 12222222119, 122222221210099.

2. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = a(n)1, i.e. the terms of the Smarandache sequence concatenated to the right with the number 1.

The first six terms of SC(n) (primes by definition):
11, 1231, 1234567891, 12345678910111,
1234567891011121314151 61,
12345678910111213141516171819202122232425261.

I conjecture that there exist an infinity of terms b(n) which are primes.

II.

The reverse sequence

S(n) is defined as the sequence obtained through the concatenation of the first n positive integers, in reverse order.

The first ten terms of the sequence (A000422 in OEIS):
1, 21, 321, 4321, 54321, 654321, 7654321, 87654321, 987654321, 10987654321.

The primes appear very rare among the terms of this sequence: until now there are only two known, corresponding to n = 82 (a number having 155 digits) şi n = 37765 (a number having 177719 digits).

3. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = a(n)1, i.e. the terms of the Smarandache sequence concatenated to the right with the number 1.

The first five terms of SC(n) (primes by definition):
11, 211, 876543211, 9876543211,
22212019181716151413121110987654321 1.

I conjecture that there exist an infinity of terms b(n) which are primes.

III.

The concatenated odd sequence

S(n) is defined as the sequence obtained through the concatenation of the first n odd numbers.

The first ten terms of the sequence (A019519 in OEIS):
1, 13, 135, 1357, 13579, 1357911, 135791113, 13579111315, 1357911131517, 135791113151719.

The terms of this sequence are primes for the following values of n: 2, 10, 16, 34, 49, 2570 (the term corresponding to n =

2570 is a number with 9725 digits); there is no other prime term known though where checked the first about 26 thousand terms of this sequence. F.S. (Florentin Smarandache) conjectured that there exist an infinity of prime terms of this sequence.

4. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = a(n+1) + a(n) – S(a(n+1)) – S(a(n)) + 2, where S(a(n)) is the sum of the digits of the term a(n).

The first five terms of SC(n) (primes by definition):
11, 137, 14897, 1371431, 13714902317.

I conjecture that there exist an infinity of terms b(n) which are primes.

5. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = a(n)1, i.e. the terms of the Smarandache sequence concatenated to the right with the number 1.

The first six terms of SC(n) (primes by definition):
11, 131, 13579111315171, 1357911131517191, 135791113151719211231, 13579111315171921232527291.

I conjecture that there exist an infinity of terms b(n) which are primes.

IV.

The concatenated even sequence

S(n) is defined as the sequence obtained through the concatenation of the first n even numbers.

The first ten terms of the sequence (A019520 in OEIS):
2, 24, 246, 2468, 246810, 24681012, 2468101214, 246810121416, 24681012141618, 2468101214161820.

The terms of this sequence can’t be, obviously, primes. In the case of this sequence might be studied the primality of the numbers obtained through the division of its terms by 2 (for instance, a(7)/2 = 1234050607 is prime).

It might be also interesting to study the primality of the numbers obtained through the division of its terms by 4 or 6.

The sequence of the primes a(n)/4: 3, 617 (...)

obtained for n = 2, 4 (...)

The sequence of the primes a(n)/6: 41, 41135020236030337 (...), obtained for n = 3, 11 (...)

6. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = a(n+1) + a(n) – S(a(n+1)) – S(a(n)) + 1, where S(a(n)) is the sum of the consecutive even numbers which form the term a(n); for instance, S(246810) = 2 + 4 + 6 + 8 + 10 = 30.

The first four terms of SC(n) (primes by definition):
1 19, 2683, 249229, 2492782129.

I conjecture that there exist an infinity of terms b(n) which are primes.

V.

The concatenated prime sequence

S(n) is defined as the sequence obtained through the concatenation of the first n primes.

The first ten terms of the sequence (A019518 in OEIS):
2, 23, 235, 2357, 235711, 23571113, 2357111317, 235711131719, 23571113171923, 2357111317192329.

The terms of this sequence are known as Smarandache-Wellin numbers. Also, the Smarandache-Wellin numbers which are primes are named Smarandache-Wellin primes. The first three such numbers are 2, 23 şi 2357; the fourth is a number with 355 digits and there are known only 8 such primes. The corresponding values of n are 1, 2, 4, 128, 174, 342, 435, 1429. F.S. conjectured that there exist an infinity of prime terms of this sequence.

7. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = 3a(n), i.e. the terms of the Smarandache sequence concatenated to the left with the number 3.

The first three terms of SC(n) (primes by definition):
3235711, 323571113171923, 32357111317192329313741.

I conjecture that there exist an infinity of terms b(n) which are primes.

VI.

The back concatenated prime sequence

S(n) is defined as the sequence obtained through the concatenation of the first n primes, in reverse order.

The first ten terms of the sequence (A038394 in OEIS):
2, 32, 532, 7532, 117532, 13117532, 1713117532, 191713117532, 23191713117532, 2923191713117532.

The terms of this sequence can't be, obviously, primes. In the case of this sequence might be studied the primality of the numbers obtained through the division of its terms by 4.

The sequence of the primes a(n)/4: 29383, 47928279383 (...) obtained for n = 5, 8 (...)

VII.

The back concatenated odd sequence

S(n) is defined as the sequence obtained through the concatenation of the first n odd numbers, in reverse order.

The first ten terms of the sequence (A038395 in OEIS):
1, 31, 531, 7531, 97531, 1197531, 131197531, 15131197531, 1715131197531, 1917151311975311.

8. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = 2*a(n) – 1.

The first four terms of SC(n) (primes by definition):
61, 1061, 15061, 262395061.

I conjecture that there exist an infinity of terms b(n) which are primes.

VIII.

The back concatenated even sequence

S(n) is defined as the sequence obtained through the concatenation of the first n even numbers, in reverse order.

The first ten terms of the sequence (A038396 in OEIS):
2, 42, 642, 8642, 108642, 12108642, 1412108642, 161412108642, 18161412108642, 2018161412108642.

9. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = a(n) – 1.

The first four terms of SC(n) (primes by definition):
41, 641, 8641, 18161412108641.

I conjecture that there exist an infinity of terms b(n) which are primes.

IX.

The concatenated square sequence

S(n) is defined as the sequence obtained through the concatenation of the first n squares.

The first ten terms of the sequence (A019521 in OEIS):
1, 14, 149, 14916, 1491625, 149162536, 14916253649, 1491625364964, 149162536496481, 149162536496481100.

The third term, the number 149, is the only prime from the first about 26 thousand terms of this sequence.

X.

The concatenated odd square sequence

S(n) is defined as the sequence obtained through the concatenation of the first n odd squares.

The first ten terms of the sequence:
1, 19, 1925, 192549, 19254981, 19254981121, 19254981121169, 19254981121169225, 19254981121169225289, 19254981121169225289361.

10. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = 2*a(n) + 1.

The first three terms of SC(n) (primes by definition):
3851, 38509963, 38509962242338451,
obtained for n = 3, 5, 8.

I conjecture that there exist an infinity of terms b(n) which are primes.

XI.

The concatenated even square sequence

S(n) is defined as the sequence obtained through the concatenation of the first n even squares.

The first ten terms of the sequence:
4, 416, 41636, 4163664, 4163664100, 4163664100144, 4163664100144196, 4163664100144196256, 4163664100144196256324, 4163664100144196256324400.

11. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = a(n) + 5.

The first three terms of SC(n) (primes by definition):
421, 41641, 4163669,
obtained for n = 2, 3, 4.

I conjecture that there exist an infinity of terms b(n) which are primes.

12. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = a(n)(a(n+1) + 1), i.e. b(n) is obtained concatenating the term a(n) with the value of the term a(n+1) added to 1.

The first three terms of SC(n) (primes by definition):
41641637, 41636641001444163664100144197,
obtained for n = 2, 6.

I conjecture that there exist an infinity of terms b(n) which are primes.

XII.

The concatenated cubic sequence

S(n) is defined as the sequence obtained through the concatenation of the first n cubes.

The first ten terms of the sequence (A019521 in OEIS):
1, 18, 1827, 182764, 182764125, 182764125216, 182764125216343, 182764125216343512, 182764125216343512729, 1827641252163435127291000.

There were not found prime terms of this sequence, though there were checked the first about 22 terms.

XIII.

The concatenated triangular numbers sequence

S(n) is defined as the sequence obtained through the concatenation of the first n triangular numbers [the triangular numbers are a subset of the polygonal numbers constructed with the formula T(n) = (n*(n + 1))/2 = 1 + 2 + 3 +...+ n].

The first ten terms of the sequence (A078795 in OEIS):
1, 13, 136, 13610, 1361015, 136101521, 13610152128, 1361015212836, 136101521283645, 13610152128364555.

The only two known primes from this sequence (among the first about 5000 terms) are 13 and 136101521.

13. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = a(n)9, i.e. the terms of the Smarandache sequence concatenated to the right with 9.

The first three terms of SC(n) (primes by definition):
19, 139, 13610159,
obtained for n = 1, 2, 5.

XIV.

The "n concatenated n times" sequence

S(n) is defined as the sequence obtained concatenating n times the number n.

The first ten terms of the sequence (A000461 in OEIS):
1, 22, 333, 4444, 55555, 666666, 7777777, 88888888, 999999999, 10101010101010101010.

There is no term of this sequence which can be prime, all terms of the sequence being repdigit numbers, therefore multiples of repunit numbers.

14. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = 2*a(n)- 1

The first four terms of SC(n) (primes by definition):
43, 8887, 111109, 1333331,
obtained for n = 2, 4, 5, 6.

I conjecture that there exist an infinity of terms b(n) which are primes.

15. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = a(n+1) - a(n).

The first three terms of SC(n) (primes by definition):
311, 4111, 611111,
obtained for n = 2, 3, 5.

I conjecture that there exist an infinity of terms b(n) which are primes.

XV.

The permutation sequence

S(n) is defined as the sequence of numbers obtained through concatenation and permutation in the following way: 13...(2n – 3)(2n – 1)(2n)(2n – 2)(2n – 4)...42.

The first seven terms of the sequence (A007943 în OEIS):
12, 1342, 135642, 13578642, 13579108642, 135791112108642, 1357911131412108642, 13579111315161412108642.

There is obviously no term of this sequence which can be prime. In the case of this sequence is studied the primality of the numbers obtained through the division of its terms by 2: 6, 671, 67821, 6789321 (...), or the primality of the numbers of the form 13...(2n – 3)(2n – 1)(2n)(2n – 2)(2n – 4)...42 ± 1.

It might be also interesting to study the primality of the numbers obtained through the division of its terms by 6.

The sequence of the primes a(n)/6:
2, 22631852018107, 226318521902018107,
obtained for n = 1, 6, 7.

XVI.

The pierced chain sequence

The sequence obtained in the following way: the first term is 101 and every next term is obtained through concatenation of the previous term with the group of digits 0101.

The first six terms of the sequence (A031982 in OEIS):
101, 1010101, 10101010101, 101010101010101, 1010101010101010101, 10101010101010101010101.

There are no primes obtained through the division of the terms of the sequence by 101 (it is proved).

XVII.

The n2*n sequence

The sequence obtained concatenating n with 2*n.

The first fifteen terms of the sequence (A019550 in OEIS):
12, 24, 36, 48, 510, 612, 714, 816, 918, 1020, 1122, 1224, 1326, 1428, 1530.

Because obviously every term of this sequence a(n) is divisible by 6*n, in the case of this sequence is studied the primality of the numbers a(n)/6*n. It is conjectured that this sequence contains infinitely many primes.

16. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = m(n)/6 + 1, where m(n) is the number obtained concatenating a(n) with a(n+1) then with a(n+2).

The first three terms of SC(n) (primes by definition):
20407, 40609, 102119137,
obtained for n = 1, 2, 6.

I conjecture that there exist an infinity of terms b(n) which are primes.

17. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = m - 1, where m(n) is the number obtained concatenating a(n) with a(n+1).

The first three terms of SC(n) (primes by definition):
1223, 510611, 612713, 9181019, 14281529,
obtained for n = 1, 5, 6, 9, 14.

I conjecture that there exist an infinity of terms b(n) which are primes.

18. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) are obtained concatenating to the right the terms a(n) with 1.

The first nine terms of SC(n) (primes by definition):
241, 5101, 6121, 8161, 9181, 12241, 14281, 17341, 19381.

I conjecture that there exist an infinity of terms b(n) which are primes.

19. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) are obtained concatenating both to the left and to the right the terms a(n) with 1.

The first eight terms of SC(n) (primes by definition):
1361, 1481, 15101, 19181, 112241, 114281, 115301, 118361.

I conjecture that there exist an infinity of terms b(n) which are primes.

XVIII.

The nn^2 sequence

The sequence obtained concatenating n with n^2.

The first fifteen terms of the sequence (A053061 in OEIS):
11, 24, 39, 416, 525, 636, 749, 864, 981, 10100, 11121, 12144, 13169, 14196, 15225.

The sequence a(n)/n is called the reduced Smarandache nn^2 sequence.

The first fifteen terms of the reduced Smarandache nn^2 sequence (A061082 in OEIS):
11, 12, 13, 104, 105, 106, 107, 108, 109, 1010, 1011, 1012, 1013, 1014, 1015.

It is conjectured that there are infinitely many primes in the reduced Smarandache nn^2 sequence.

The sequence a(n) obtained concatenating the numbers n and n^m is called the Smarandache nn^m sequence and, for any value of m, contains only one prime, the number 11.

The sequence a(n)/n is called the reduced Smarandache nn^m sequence.

20. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = a(n) + n + 1.

The first ten terms of SC(n) (primes by definition):
13, 43, 421, 643, 757, 991, 10111, 12157, 15241, 13183.

I conjecture that there exist an infinity of terms b(n) which are primes.

21. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) are obtained concatenating to the right the terms a(n) with 1.

The first seven terms of SC(n) (primes by definition):
241, 6361, 8641, 9181, 111211, 121441, 298411.

I conjecture that there exist an infinity of terms b(n) which are primes.

22. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) are obtained concatenating to the right the terms a(n) with 11.

The first eight terms of SC(n) (primes by definition):
2411, 3911, 41611, 52511, 63611, 1419611, 1522511, 1728911.

I conjecture that there exist an infinity of terms b(n) which are primes.

23. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) are obtained concatenating both to the left and to the right the terms a(n) with 1.

The first six terms of SC(n) (primes by definition):
16361, 17491, 111211, 1183241, 1266761, 1287841.

I conjecture that there exist an infinity of terms b(n) which are primes.

XIX.

The nk^n generalized sequence

The n-th term of the sequence a(n) is obtained concatenating all of the numbers n, 2*n, 3*n,..., n*n.

The first eight terms of the sequence (A053062 in OEIS):
1, 24, 369, 481216, 510152025, 61218243036, 7142128354249, 816243240485664.

24. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = 2*a(n) - 1.

The first five terms of SC(n) (primes by definition):
47, 962431, 1020304049, 14284256708497, 1632486480971327.

I conjecture that there exist an infinity of terms b(n) which are primes.

XX.

The breakup prime sequence

The n-th term of the sequence is defined as the smallest positive integer which, by concatenation with all previous terms, forms a prime.

The first nine terms of the sequence (A048549 in OEIS):
2, 23, 233, 2333, 23333, 2333321, 233332117, 2333321173, 233332117313.

25. Smarandache-Coman sequence

SC(n) is defined as follows: b(n) = a(n) + a(n+1) + 1.

The first two terms of SC(n) (primes by definition):
257, 25667 (...)

I conjecture that there exist an infinity of terms b(n) which are primes.