Two conjectures on the number of primes obtained concatenating to the left with numbers lesser than p a prime p

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Abstract. In this paper I conjecture that: (I) for any prime p of the form 6*k + 1 there are obtained at least n primes concatenating p to the left with the (p – 1) integers lesser than p, where n ≥ (p - 10)/3; (II) for any prime p of the form 6*k – 1, p ≥ 11, there are obtained at least n primes concatenating p to the left with the (p – 1) integers lesser than p, where n ≥ (p - 8)/3.

Conjecture I:

For any prime p of the form 6*k + 1 there are obtained at least n primes concatenating p to the left with the (p – 1) integers lesser than p, where n ≥ (p - 10)/3.

Verifying the conjecture:
(for the first n primes p)

: for p = 7 we have the primes 17, 37, 47, 67 and 4 > (7 - 10)/3;

: for p = 13 we have the primes 113, 313, 613, 1013, 1213 and 5 > (13 - 10)/3 = 1;

: for p = 19 we have the primes 419, 619, 719, 919, 1019, 1319, 1619 and 7 > (19 - 10)/3 = 3;

: for p = 31 we have the primes 131, 331, 431, 631, 1031, 1231, 1531, 1831, 1931, 2131, 2531, 2731 and 12 > (31 - 10)/3 = 7;

: for p = 37 we have the primes 137, 337, 937, 1237, 1637, 2137, 2237, 2437, 2837, 3037, 3137, 3637 and 12 > (37 - 10)/3 = 9;

: for p = 43 we have the primes 443, 643, 743, 1543, 2143, 2243, 2543, 2843, 3343, 3643, 3943, 4243 and 12 > (43 - 10)/3 = 11;

: for p = 61 we have the primes 461, 661, 761, 1061, 1361, 1861, 2161, 2861, 3061, 3361, 3461, 3761, 4261, 4561, 4861, 5261, 5861 and 17 = (61 - 10)/3 = 17;

: for p = 67 we have the primes 167, 367, 467, 967, 1367, 1567, 1667, 1867, 2267, 2467, 2767, 3067, 3167, 3467, 3767, 3967, 4567, 5167, 5867, 6367 and 20 > (67 - 10)/3 = 19;

: for p = 73 we have the primes 173, 373, 673, 773, 1373, 1873, 1973, 2273, 2473, 3373, 3673, 4073, 4273, 4373, 4673, 4973, 5273, 5573, 6073, 6173, 6373, 6473, 6673 and 23 > (73 - 10)/3 = 21;

: for p = 79 we have the primes 179, 379, 479, 1279, 1579, 1879, 1979, 2179, 2579, 2879, 3079, 3779, 4079, 4679, 5179, 5279, 5479, 5779, 5879, 6079, 6379, 6679, 6779, 7079, 7879 and 25 > (79 - 10)/3 = 23;

: for p = 97 we have the primes 197, 397, 797, 997, 1097, 1297, 1597, 1697, 1997, 2297, 2797, 2897, 3697, 3797, 4297, 4397, 4597, 5197, 5297, 5897, 6197, 6397, 6997, 7297, 8297, 8597, 9397, 9497, 9697 and 29 = (97 - 10)/3 = 29.

Conjecture II:

For any prime p of the form 6*k – 1, p ≥ 11, there are obtained at least n primes concatenating p to the left with the (p – 1) integers lesser than p, where n ≥ (p - 8)/3.

Verifying the conjecture:
(for the first n primes p)

: for p = 11 we have the primes 211, 311, 811, 911 and 4 > (11 - 8)/3 = 1;

: for p = 17 we have the primes 317, 617, 1117, 1217 and 4 > (17 - 8)/3 = 3;

: for p = 23 we have the primes 223, 523, 823, 1123, 1223, 1423, 1523, 1723, 1823 and 9 > (23 - 8)/3 = 5;

: for p = 29 we have the primes 229, 829, 929, 1129, 1229, 1429, 2029, 2129, 2729 and 9 > (29 - 8)/3 = 7;

: for p = 41 we have the primes 241, 541, 641, 941, 1741, 2141, 2341, 2441, 2741, 3041, 3541 and 11 = (41 - 8)/3 = 11;

: for p = 47 we have the primes 347, 547, 647, 947, 1447, 1747, 1847, 2347, 2447, 2647, 3347, 3547, 3847, 3947, 4447, 4547 and 16 > (47 - 8)/3 = 13;

: for p = 53 we have the primes 353, 653, 853, 953, 1153, 1453, 1553, 1753, 2053, 2153, 2753, 2953, 3253, 3853, 4153, 4253, 5153 and 17 > (53 - 8)/3 = 15;

: for p = 59 we have the primes 359, 659, 859, 1259, 1459, 1559, 1759, 2459, 2659, 3259, 3359, 3559, 3659, 4159, 4259, 4759, 5059, 5659 and 18 > (59 - 8)/3 = 17;

: for p = 71 we have the primes 271, 571, 971, 1171, 1471, 1571, 1871, 2371, 2671, 2971, 3271, 3371, 3571, 3671, 4271, 4871, 5171, 5471, 6271, 6571, 6871, 6971 and 22 > (71 - 8)/3 = 21;

: for p = 83 we have the primes 283, 383, 683, 883, 983, 1283, 1483, 1583, 1783, 2083, 2383, 2683, 3083, 3583, 4283, 4483, 4583, 4783, 5483, 5683, 5783, 6883, 6983, 7283, 7583, 7883 and 26 > (83 - 8)/3 = 25;

: for p = 89 we have the primes 389, 1289, 1489, 1789, 1889, 2089, 2389, 2689, 2789, 3089, 3389, 3889, 3989, 4289, 4789, 4889, 5189, 5689, 6089, 6389, 6689, 7489, 7589, 7789, 8989, 8389, 8689 and 27 = (89 - 8)/3 = 27.