Conjecture on the primes of the form (q+n)2^n+1 where q odd prime

Abstract. In this paper I first conjecture that for any non-null positive integer n there exist an infinity of primes p such that the number q = (p – 1)/2^n – n is also prime and than I conjecture that for any odd prime q there exist an infinity of positive integers n such that the number p = (q + n)*2^n + 1 is prime.

Conjecture:

For any non-null positive integer n there exist an infinity of primes p such that the number q = (p – 1)/2^n – n is also prime.

Examples:
(for n = 1)

: for p = 13, (13 – 1)/2^1 – 1 = 5, prime;
: for p = 17, (17 – 1)/2^1 – 1 = 7, prime;
: for p = 29, (29 – 1)/2^1 – 1 = 13, prime;
: for p = 37, (37 – 1)/2^1 – 1 = 17, prime;
: for p = 41, (41 – 1)/2^1 – 1 = 19, prime;
: for p = 61, (61 – 1)/2^1 – 1 = 29, prime;
[...]
: for p = 104537, (104537 – 1)/2^1 – 1 = 52267, prime;
: for p = 104729, (104729 – 1)/2^1 – 1 = 52363, prime.

Examples:
(for n = 2)

: for p = 29, (29 – 1)/2^2 – 2 = 5, prime;
: for p = 37, (37 – 1)/2^2 – 2 = 7, prime;
: for p = 53, (53 – 1)/2^2 – 2 = 11, prime;
: for p = 61, (61 – 1)/2^2 – 2 = 13, prime;
[...]
: for p = 104693, (104693 – 1)/2^2 – 2 = 26171, prime.
: for p = 104717, (104717 – 1)/2^2 – 2 = 26177, prime.

Examples:
(for n = 3)

: for p = 113, (113 – 1)/2^3 – 3 = 11, prime;
: for p = 192, (192 – 1)/2^3 – 3 = 23, prime;
: for p = 257, (256 – 1)/2^3 – 3 = 29, prime;
: for p = 353, (353 – 1)/2^3 – 3 = 41, prime.

Examples:
(for n = 4)

: for p = 113, (113 – 1)/2^4 – 4 = 3, prime;
: for p = 337, (337 – 1)/2^4 – 4 = 17, prime;
: for p = 433, (433 – 1)/2^4 – 4 = 23, prime.

Examples:
(for n = 5)

: for p = 577, (577 – 1)/2^5 – 5 = 13, prime.

Examples:
(for n = 6)

: for p = 577, (577 – 1)/2^6 – 6 = 3, prime;
[...]
: for p = 104513, (104513 – 1)/2^6 – 6 = 1627, prime.

Conjecture:

For any odd prime q there exist an infinity of positive integers n such that the number p = (q + n)*2^n + 1 is prime.

: for q = 3, the least n for which p is prime is n = 4, because (3 + 4)*2^4 + 1 = 113, prime;
: for q = 5, the least n for which p is prime is n = 1, because (5 + 1)*2^1 + 1 = 13, prime;
: for q = 7, the least n for which p is prime is n = 1, because (7 + 1)*2^1 + 1 = 17, prime;
: for q = 11, the least n for which p is prime is n = 2, because (11 + 2)*2^2 + 1 = 53, prime;
: for q = 13, the least n for which p is prime is n = 1, because (13 + 1)*2^1 + 1 = 29, prime;
: for q = 17, the least n for which p is prime is n = 1, because (17 + 1)*2^1 + 1 = 37, prime;
: for q = 19, the least n for which p is prime is n = 1, because (19 + 1)*2^1 + 1 = 41, prime;
: for q = 23, the least n for which p is prime is n = 2, because (23 + 2)*2^2 + 1 = 101, prime;
: for q = 29, the least n for which p is prime is n = 1, because (29 + 1)*2^1 + 1 = 61, prime;
: for q = 31, the least n for which p is prime is n = 5, because (31 + 5)*2^5 + 1 = 1153, prime [note the interesting fact that for n = 4 is obtained (31 + 4)*2^4 + 1 = 561, the first absolute Fermat pseudoprime].

Taking seven larger consecutive primes were obtained:

: for q = 104693, the least n for which p is prime is n = 8, because (104693 + 8)*2^8 + 1 = 26803457, prime;
: for q = 104701, the least n for which p is prime is n = 2, because (104701 + 2)*2^2 + 1 = 418813, prime;
: for q = 104707, the least n for which p is prime is n = 2, because (104707 + 2)*2^2 + 1 = 418837, prime;
: for q = 104711, the least n for which p is prime is n = 4, because (104711 + 4)*2^4 + 1 = 1675441, prime;
: for q = 104717, the least n for which p is prime is n = 7, because (104717 + 7)*2^7 + 1 = 13404673, prime;
: for q = 104723, the least n for which p is prime is n = 1, because (104723 + 1)*2^1 + 1 = 209449, prime;
: for q = 104729, the least n for which p is prime is n = 8, because (104729 + 8)*2^8 + 1 = 26812673, prime;

Note the relative small value of n for which the first prime is found!