Formulas that generate large primes and products of very few primes based on Carmichael numbers and the number 375

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Abstract. In this paper I combine my interest for Carmichael numbers with my interest for finding formulas that generate large primes or products of very few primes showing few easy ways for obtaining such numbers and at the same time an interesting relation between absolute Fermat pseudoprimes and the number 375.

Observation 1:

The formula N = (C + 375)/2^k, where C is a Carmichael number and k the largest positive integer such that N is integer, conducts often to primes, semiprimes or products of very few primes.

Verifying the observation:
(For the first nine Carmichael numbers)

: (561 + 375)/2^3 = 3^2*13;
: (1105 + 375)/2^3 = 5*37;
: (1729 + 375)/2^3 = 263, prime;
: (2465 + 375)/2^3 = 5*71;
: (2821 + 375)/2^2 = 17*47;
: (6601 + 375)/2^6 = 109, prime;
: (8911 + 375)/2^1 = 4643, prime;
: (10585 + 375)/2^4 = 5*137;
: (15841 + 375)/2^3 = 2027, prime.

Verifying the observation:
(For nine larger consecutive Carmichael numbers)

: (1710090154081 + 375)/2^3 = 213761269307, prime;
: (1710489607561 + 375)/2^8 = 6681600031, prime;
: (1710921204721 + 375)/2^3 = 31*9421*732287;
: (1711769015881 + 375)/2^6 = 13*2057414683;
: (1712065776121 + 375)/2^3 = 1277*167568811;
: (1711882972801 + 375)/2^4 = 83*15671*82267;
: (1712919512305 + 375)/2^3 = 5*42822987817;
: (1713000920401 + 375)/2^3 = 587*364778731;
: (1713045574801 + 375)/2^3 = 13*16471592069.

Observation 2:

The formula N = (C^2 + 375)/2^3, where C is a Carmichael number, conducts often to primes, semiprimes or products of very few primes.

Verifying the observation:
(For the nine larger consecutive Carmichael numbers considered above)

: (1710090154081^2 + 375)/2^3 = 365551041885597290119367, prime;
: (1710489607561^2 + 375)/2^3 = 257*13247453*107420057884397;
: (1710921204721^2 + 375)/2^3 = 79*7457*621124694825004709;
: (1711769015881^2 + 375)/2^3 = 186301*1966007404502798717;
: (1712065776121^2 + 375)/2^3 = 91442327*4006855082773651;
: (1711882972801^2 + 375)/2^3 = 366317914070748663223247, prime;
: (1712919512305^2 + 375)/2^3 = 5^2*16253*4518571*199760341309;
: (1713000920401^2 + 375)/2^3 = 6867557*53410043653344871;
: (1713045574801^2 + 375)/2^3 = 7673*9391*34549*147344974321.

Observation 3:

The formula N = (C^3 + 375)/2^k, where C is a Carmichael number and k the largest positive integer such that N is integer, conducts often to primes, semiprimes or products of very few primes.

Note: From the larger Carmichael numbers considered above, the number N = (1710921204721^3 + 375)/2^3 is a prime, *i.e.* N = 626037054795853404691714729076062217 (a prime with 36 digits!), also the number N = (1711769015881^3 + 375)/2^4 is a semiprime, *i.e.* N = 61*51390833990359175137727367128207 41 and the other numbers obtained are products of very few prime factors.

Conclusion:

Probably the general formula N = (C^j + 375)/2^k, where C is a Carmichael number, j a positive integer and k the largest positive integer such that N is integer, conducts often to primes, semiprimes or products of very few primes.