

Operation based on multiples of three and concatenation for obtaining primes and m-primes and the definition of a m-prime

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Abstract. In this paper I show how, concatenating to the right the multiples of 3 with the digit 1, obtaining the number m , respectively with the number 11, obtaining the number n , by the simple operation $n - m + 1$, under the condition that both m and n are primes, is obtained often (I conjecture that always) a prime or a composite $r = p(1)*p(2)*\dots$, where $p(1), p(2), \dots$ are the prime factors of r , which have the following property: there exist $p(k)$ and $p(h)$, where $p(k)$ is the product of some distinct prime factors of r and $p(h)$ the product of the other distinct prime factors such that the number $p(k) + p(h) - 1$ is m-prime and I also define a m-prime.

Conjecture:

Concatenating to the right the multiples of 3 with the digit 1, obtaining the number m , respectively with the number 11, obtaining the number n , by the simple operation $n - m + 1$, under the condition that both m and n are primes, is obtained always a prime or a composite $r = p(1)*p(2)*\dots$, where $p(1), p(2), \dots$ are the prime factors of r , which have the following property: there exist $p(k)$ and $p(h)$, where $p(k)$ is the product of some distinct prime factors of r and $p(h)$ the product of the other distinct prime factors such that the number $p(k) + p(h) - 1$ is m-prime.

Definition:

We name a m-prime a positive odd integer which is either prime either semiprime of the form $p(1)*q(1)$, with the property that the number $p(1) + q(1) - 1$ is either prime either semiprime $p(2)*q(2)$ with the property that the number $p(2) + q(2) - 1$ is either prime either semiprime with the property showed above... (until, eventually, is obtained a prime).

Example: 5411 is a m-prime because $5411 = 7*773$, where $7 + 773 - 1 = 779 = 19*41$, where $19 + 41 - 1 = 59$, a prime.

Verifying the conjecture:

(for the first 20 multiples of 3 for which both numbers obtained by concatenation with 1 respectively with 11 are primes)

For 3, both 31 and 311 are primes;
: the number $311 - 31 + 1 = 281$ is prime;

For 15, both 151 and 1511 are primes;
: the number $1511 - 151 + 1 = 1361$ is prime;

For 18, both 181 and 1811 are primes;
: the number $1811 - 181 + 1 = 1631$ is m-prime because is equal to $7 \cdot 233$ and $7 + 233 - 1 = 239$ which is prime;

For 21, both 211 and 2111 are primes;
: the number $2111 - 211 + 1 = 1901$ is prime;

For 24, both 241 and 2411 are primes;
: the number $2411 - 241 + 1 = 2171$ is m-prime because is equal to $13 \cdot 167$ and $13 + 167 - 1 = 179$ which is prime;

For 27, both 271 and 2711 are primes;
: the number $2711 - 271 + 1 = 2441$ is prime;

For 42, both 421 and 4211 are primes;
: the number $4211 - 421 + 1 = 3791$ is m-prime because is equal to $17 \cdot 223$ and $17 + 223 - 1 = 239$ which is prime;

For 57, both 571 and 5711 are primes;
: the number $5711 - 571 + 1 = 5141$ is m-prime because is equal to $53 \cdot 97$ and $53 + 97 - 1 = 149$ which is prime;

For 60, both 601 and 6011 are primes;
: the number $6011 - 601 + 1 = 5411$ is m-prime because is equal to $7 \cdot 773$ and $7 + 773 - 1 = 779 = 19 \cdot 41$, where $19 + 41 - 1 = 59$, which is prime;

For 63, both 631 and 6311 are primes;
: the number $6311 - 631 + 1 = 5681$ is m-prime because is equal to $13 \cdot 19 \cdot 23$ and $13 \cdot 19 + 23 - 1 = 269$ which is prime;

For 69, both 691 and 6911 are primes;
: the number $6911 - 691 + 1 = 6221$ is prime;

For 81, both 811 and 8111 are primes;
: the number $8111 - 811 + 1 = 7301$ is m-prime because is equal to $7^2 \cdot 149$ and $7^2 + 149 - 1 = 197$ which is prime;

For 102, both 1021 and 10211 are primes;
: the number $10211 - 1021 + 1 = 9191$ is m-prime because is equal to $7 \cdot 13 \cdot 101$ and $7 \cdot 13 + 101 - 1 = 191$ which is prime;

For 120, both 1201 and 12011 are primes;
: the number $12011 - 1201 + 1 = 10811$ is m-prime because is equal to $19 \cdot 569$ and $19 + 569 - 1 = 587$ which is prime;

For 129, both 1291 and 12911 are primes;
 : the number $12911 - 1291 + 1 = 11621$ is prime;
 For 183, both 1831 and 18311 are primes;
 : the number $18311 - 1831 + 1 = 16481$ is prime;
 For 216, both 2161 and 21611 are primes;
 : the number $21611 - 2161 + 1 = 19451$ is m-prime
 because is equal to $53 \cdot 367$ and $53 + 367 - 1 = 419$
 which is prime;
 For 225, both 2251 and 22511 are primes;
 : the number $22511 - 2251 + 1 = 20261$ is prime;
 For 228, both 2281 and 22811 are primes;
 : the number $22811 - 2281 + 1 = 20531$ is m-prime
 because is equal to $7^2 \cdot 419$ and $7^2 + 419 - 1 = 467$
 which is prime;
 For 267, both 2671 and 26711 are primes;
 : the number $26711 - 2671 + 1 = 24041$ is m-prime
 because is equal to $29 \cdot 829$ and $29 + 829 - 1 = 857$
 which is prime.