Two formulas for obtaining primes and cm-integers

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Abstract. In this paper I present two very interesting and easy formulas that conduct often to primes or cm-integers (c-primes, m-primes, cm-primes, c-composites, m-composites, cm-composites).

Formula 1:

: Take two distinct odd primes p and q;
: Find a prime r such that the numbers r + p - 1 and r + q - 1 are both primes;
: Then the numbers p*q - r + 1, p*r - q + 1 and q*r - p + 1, in absolute value, are often primes or cm-integers.

Verifying the formula:
(for few randomly chosen values)

We take (p, q) = (7, 13):

r = 5 satisfies the condition and:
: 7*13 - 5 + 1 = 87 = 3*29, m-prime (29 + 3 - 1 = 31, prime);
: 5*13 - 7 + 1 = 59, prime;
: 5*7 - 13 + 1 = 23, prime.

r = 31 satisfies the condition and:
: 7*13 - 31 + 1 = 61, prime;
: 31*13 - 7 + 1 = 397, prime;
: 31*7 - 13 + 1 = 205 = 5*41, c-prime (41 - 5 + 1 = 37, prime);

r = 97 satisfies the condition and:
: 97 - 7*13 + 1 = 7, prime;
: 97*13 - 7 + 1 = 1255 = 5*251, c-prime (251 - 5 + 1 = 247 = 13*19 and 19 - 13 + 1 = 7, prime);
: 97*7 - 13 + 1 = 667 = 23*29, c-prime (29 - 23 + 1 = 7, prime);

r = 14627 satisfies the condition and:
: 14627 - 7*13 + 1 = 14537, prime;
: 14627*13 - 7 + 1 = 190145 = 5*17*2237, c-composite (2237 - 5*17 + 1 = 2153, prime);
: 14627*7 - 13 + 1 = 102377 = 11*41*227, m-composite (11*41 + 227 - 1 = 677, prime).

Formula 2:

: Take two distinct odd primes p and q;
: Find a prime r such that the numbers r – p + 1 and r – q + 1 are both primes;
: Then the numbers p*q + r – 1, p*r + q – 1 and q*r + p – 1 are often primes or cm-integers.

Verifying the formula:

(for few randomly chosen values)

We take (p, q) = (7, 13):

r = 109 satisfies the condition and:
: 7*13 + 109 – 1 = 199, prime;
: 109*7 + 13 - 1 = 775 = 5^2*31, c-compozite (31 – 5*5 + 1 = 7, prime);
: 109*13 + 7 - 1 = 1423, prime.

r = 163 satisfies the condition and:
: 7*13 + 163 - 1 = 253 = 11*23, c-prime (23 – 11 + 1 = 13, prime);
: 163*7 + 13 - 1 = 1153, prime;
: 163*13 + 7 - 1 = 2125 = 5^3*17, cm-composite (5*17 – 5*5 + 1 = 61, prime and 5*17 + 5*5 = 109, prime).

r = 1439 satisfies the condition and:
: 7*13 + 1439 - 1 = 1529 = 11*139, m-prime (11 + 139 – 1 = 149, prime);
: 1439*7 + 13 - 1 = 10085 = 5*2017, m-prime (5 + 2017 – 1 = 2021, prime);
: 1439*13 + 7 - 1 = 18713, prime.

We take (p, q) = (23, 89):

r = 101 satisfies the condition and:
: 23*89 + 101 - 1 = 2147 = 19*113, cm-prime (113 – 19 + 1 = 97, prime and 113 + 19 – 1 = 131, prime);
: 101*23 + 89 - 1 = 2411, prime;
: 101*89 + 23 - 1 = 9011, prime.

r = 131 satisfies the condition and:
: 23*89 + 131 - 1 = 2177 = 7*311, m-prime (7 + 311 + 7 – 1 = 317, prime);
: 131*23 + 89 - 1 = 3101 = 7*443, cm-prime (443 – 7 + 1 = 437 = 19*23 and 23 – 19 + 1 = 5, prime and 443 + 7 – 1 = 449, prime);
: 131*89 + 23 - 1 = 11681, prime.