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New Method in Mathematics’ for Factorization

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Abstract:	A new method has been found for finding factors of 2p-1, when “p” is prime. This method finds the factors of 2^p-1 when it does not produce a Mersenne Prime. The conditions which must be present is a very long list of intergers without the primes in the list. Also I use python 3.7 to prove this theory to be an axiom, when the inputed “z” is prime. The axiom behind it, is that given a prime number “z” which does not make a Mersenne prime using the formula 2^z-1 it must be 1st squared then multiplied by some number (a), then z is added to the product of ((z^2 x (a)). The end result formula is ((z^2 x (a))+z) which will find factors when this additional part of python code works in conjunction with it.

Thomas E. O'Neil

November 15, 2019

To whom it may concern:

I'm an avid number theorist and I seek patterns in prime numbers every day. I have something of interest to you regarding Mersenne Prime Numbers of the the 2^n-1 and factorization.

A new method has been found for finding factors of 2p-1, when "p" is prime. This method finds the factors of 2^p-1 when it does not produce a Mersenne Prime. The conditions which must be present is a very long list of intergers without the primes in the list. Also I use python 3.7 to prove this theory to be an axiom, when the inputed "z" is prime. The axiom behind it, is that given a prime number "z" which does not make a Mersenne prime using the formula 2^z-1 it must be 1st squared then multiplied by some number (a), then z is added to the product of ((z^2 x (a)). The end result formula is ((z^2 x (a))+z) which will find factors when this additional part of python code works in conjunction with it.

Sincerely yours

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New Method in Mathematics' for Factorization

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Abstract

A new method has been found for finding factors of 2p-1, when "p" is prime. This method finds the factors of 2^p-1 when it does not produce a Mersenne Prime. The conditions which must be present is a very long list of intergers without the primes in the list. Also I use python 3.7 to prove this theory to be an axiom, when the inputed "z" is prime. The axiom behind it, is that given a prime number "z" which does not make a Mersenne prime using the formula 2^z-1 it must be 1st squared then multiplied by some number (a), then z is added to the product of ((z^2 x (a)). The end result formula is ((z^2 x (a))+z) which will find factors when this additional part of python code works in conjunction with it.

print([((int(i)-z) % (z*z)) if isinstance(i, str) else i for i in lst1z])

2^11-1 equals 2047 and its factors are 1 x 2047 and 23 x 89. 2047 is not a Mersenne Prime, because of the factors 23 x 89.

Here is an example: Let's use z = 11 for the prime test as a factor search with the described method below .

while True:

z = int(input("square of primes multiplied by a number plus z which does not make a Mersenne prime, this finds its factor of z: "))

lst1z = [1, '77', 2, '91', 3, '119', 4, '121', 5, '133', 6, '143', 7, '161', 8, '169', 9, '187', 10, '203', 11, '209', 12, '217', 13, '221', 14, '247', 15, '253']

When utilizing the partial list from above and python code. The ***O'Neil factorization method*** *employs z=11 as*
11^2 = 121 x (a) = 242 then 11 is added to 242 = 253. So what the print statement does to the list is when z is inputed as 11. Eleven is then subtracted from every quoted portion of the list then mod 121 is applied to the list concurerntly. This produces a zero in the quoted place mark for the enumerated number 15 in the list.

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*print([((int(i)-z) % (z*z)) if isinstance(i, str) else i for i in lst1z])*

Now when searching through the list for a zero in the output, the zero would be found next to 15. Then go back to the code in the lst1z:

lst1z = [1, '77', 2, '91', 3, '119', 4, '121', 5, '133', 6, '143', 7, '161', 8, '169', 9, '187', 10, '203', 11, '209', 12, '217', 13, '221', 14, '247', 15, '253']

*Go to 15 in lst1z and there is 253. Divide 253 by 11 and the factor **23 is found**! Given a large enough list, every inputed z interger prime with this condition from the formula 2^z-1 which does not produce a Mersenne Prime utilizing the **O'Neil factorization Method** will work 100% of the time.*

Keywords: n = factor, (a) = some number

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1. O'Neil factorization Method

Terms n = factor

In mathematics, factorization or factoring consists of writing a number or another mathematical object as a product of several factors, usually smaller or simpler objects of the same kind. For example, 3 × 5 is a factorization of the integer 15.

Factorization is done through division and it is a tedious process when finding large Mersenne Primes.This program which I devised (given a list that is long enough) finds factors of prime numbers using this formula (2^z-1 mod n) that is "z" when inserted to the formula 2^z-1 does not form a Mersenne prime number.

As a matter of fact this is a whole new method for finding factors of which a prime does not make a Mersenne prime using 2^z-1.

The axiom behind it, is that given a prime number "z" which does not make a Mersenne prime using the formula 2^z-1 must be 1st squared then multiplied by some number (a), then z is added to the product of ((z^2 x (a)). The end result formula is ((z^2 x (a))+z).

Some prime numbers of the form 2^z-1 make a Mersenne prime numbers, however some prime numbers like z=11 or z=23 and z=29 do not. This program finds factors of any prime "z" which does not make a Mersenne primes with this formula 2^z-1. This new way for finding factors of primes which does not form Mersenne primes using 2^z-1 will work in this list up to a factor of 431 which is a a factor of 2^43-1. Don't use z=41, the factor is too large for the list. You do need to increase the length of the list to find factors of other primes which do not make Mersenne primes using 2^z-1 for this medthod. As a matter of fact this program can find anyfactor of 2^z-1 which does not form a Mersenne prime which uses a prime number given that the list is long enough.

How to use program? Simply run program in python 3.7 idle, then use find (match case, whole word, wrap around) for a 1st "0" or 2nd "0" and 3rd "0", yet regardless there should be few zero's when doing a search for a factor, so if it is not the 1st through 3rd zero, then you need to do a little trial and error when finding your factors.

Use find in idle within output, now remember the number to the left of the number "0", now go back to list where the code is and use find in idle using that number, then look to the right of the number and then divide it by "z" the inputed number . This number then found should be (n=factor) and the factor of (2^z-1 mod n) will equal "0", if it does not equal zero, then go to the next zero in the output and repeat process to test if it is not a Mersenne prime. If this is not your factor then go to the next zero and perform operation again until factor is found. A quick test to see if you found the factor would be to use (2^z-1 mod n) and if it does not equal zero then go to next zero.

If you try this with a Mersenne prime you will find zero's, however remember to use this equation (2^z-1 mod n) with that number found at the "0", so check if it is a factor or a Mersenne prime, if you used a Mersenne prime you should never get a zero reported back! A factor should report back as "0", but a Mersenne prime will always report back as a "number" not a zero, while using(2^z-1 mod n).

Of course if you are using z as a root of a Mersenne prime then (2^z-1 mod n) will report back a zero if you mod it by the Mersenne prime or 1!

1.1 Python Code

```
while True:

  z = int(input("square of  primes multiplied by a number plus z which does not make a Mersenne prime, this finds its factor of z: "))

 lst1z = [ 1, '77', 2, '91', 3, '119', 4, '121', 5, '133', 6, '143', 7,
'161', 8, '169', 9, '187', 10, '203', 11, '209', 12, '217', 13, '221',
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print([((int(i)-z) % (z*z)) if isinstance(i, str) else i for i in lst1z])

1.11 Conclusion

The only obstacle I can foresee is that when searching for a factor would be the frequency of “0”s that surface while using the find features in python 3.7. I submit that a great deal of more zero’s should be present after a search using a Mersenne Prime root. However if you search with a prime number that produces factors from 2^n-1 there should be less zero’s for the search. When the list is at least a zillion digits long, it is feasible that someone may find a new very large Mersenne Prime Number using the O’Neil Factorization Method! The Mersenne Prime would have to be larger than $2^{82,589,933}$-1.

The Electronic Frontier Foundation is offering a $150,000 award to the first person or group to discover a 100 million digit prime number!

https://www.mersenne.org/

Acknowledgements

Marin Mersenne, Marin Mersennus or le Père Mersenne (French: [mɛʀsɛn]; 8 September 1588 – 1 September 1648) was a French polymath, whose works touched a wide variety of fields. He is perhaps best known today among mathematicians for Mersenne prime numbers, those which can be written in the form Mn = 2n − 1 for some integer n.

References

N/A