Can be for a number k, (2[k]m)+1 always prime for all number m?

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0- Abstract:

This paper is about hyperoperators. In this paper I ask myself and the mathematical community if there is possible that a k-ation of the number 2 will be always a number prime for any number m if we add the number one to the result.

1- Introduction:

We will use hyperoperators tools to enunciate this conjecture. Lets refresh some concepts. The addition is "n copies of 1 added to a combined by succession.". The multiplication is "n copies of a combined by addition.". The exponentiation is "n copies of a combined by multiplication.". The tetration is "n copies of a combined by exponentiation, right-to-left.".[1] The pentation is "n copies of a combined by tetration, right-to-left." and so on.

Going to the "easy" counterexamples we have that in:

a) Addition: (2+3)+1=(2[1]3)+1=6 which is not prime

b) Multiplication: (2x4)+1=(2[2]4)+1=9 which is not prime.

c) Exponentiation: (2^3)+1=(2[3]3)+1=9 which is not prime

d) Tetration: (2↑2↑2↑2↑2)+1=(2[4]5)+1 which is not prime,

is a number with 19729 digits [2].

Going with more hard examples we have pentation, the first cases are:

e) Pentation: (2[5]1)+1=2+1=3 which is prime.

(2[5]2)+1)=4+1=5 which is prime.

(2[5]3)+1)=65536+1=65537 which is prime.

But, the problem begins with (2[5]4)+1 which is huge number, one of that number that I can not calculate even understand at all.

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2: Conjecture:

As the tittle said the conjecture is the following:

“Can be for a number k, (2[k]m)+1 always a primer number for all number m?”

I do not know if there exists a counterexample in pentation or not, if there is one we should look for 6-ation. Anyway the conjecture goes further and can allow any k-ation.

3: Conclusions:

Since old times mathematicians have been looking for a sequence of number or a determinate formulae that always give us prime numbers. That is a fair trying, Fermat or Mersenne will be in that way, even Eiseinstein. Sometimes is hard to proof it, and in the most of cases we have ended obtaining a disproof of the conjectures, if someone asks to me if I believe if this conjecture is true or false I would say that is false, but I do not have enough mathematical tools to disproof it.

4: References:

[1] https://en.wikipedia.org/wiki/Pentation & https://en.wikipedia.org/wiki/Tetration

[2] (2^2^...^2) (n times) + 1. Serie. https://oeis.org/A007516