New Prime Numbers

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I have found some new prime numbers using the PROTH program of Yves Gallot. This program in based on the following theorem:

Proth Theorem (1878):

Let $N = k \cdot 2^n + 1$ where $k < 2^n$. If there is an integer number a so that $a^{\frac{N-1}{2}} \equiv -1 \pmod{N}$ therefore N is prime.

The Proth progam is a test for primality of greater numbers defined as $k \cdot b^n + 1$ or $k \cdot b^n - 1$. The program is made to look for numbers of less than 5.000000 digits and it is optimized for numbers of more than 1000 digits..

Using this Program, I have found the following prime numbers:

$3239 \cdot 2^{12345} + 1$	with 3720 digits	$a = 3, \quad a = 7$
$7551 \cdot 2^{12345} + 1$	with 3721 digits	$a = 5, \quad a = 7$
$7595 \cdot 2^{12345} + 1$	with 3721 digits	$a = 3, \quad a = 11$
$9363 \cdot 2^{12321} + 1$	with 3713 digits	$a = 5, \quad a = 7$

Since the exponents of the first three numbers are Smarandache number Sm(5)=12345 we can call this type of prime numbers, prime numbers of Smarandache .

Helped by the MATHEMATICA progam, I have also found new prime numbers which are a variant of prime numbers of Fermat. They are the following:

$$2^{2^n} \cdot 3^{2^n} - 2^{2^n} - 3^{2^n} \text{ for n=1, 4, 5, 7 .}$$

It is important to mention that for n=7 the number which is obtained has 100 digits.

Chris Nash has verified the values n=8 to n=20, this last one being a number of 815.951 digits, obtaining that they are all composite. All of them have a tiny factor except n=13.

References:

Smarandache Factors and Reverse Factors. Micha Fleuren. Smarandache Notions Journal Vol. 10.
www.gallup.unm.edu/~Smarandache.
The Prime Pages. www.utm.edu/research/primes

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