OPINION

Program to calculate the 15 first mersenne's primes numbers and further perharps

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ABSTRACT

This article present an algorythm to calculate the 15 first Mersenne's Primes Numbers with the knwoledge of the 2 first 3 and 5.

Key words: *Mersenne; Primes; Algorithm*

INTRODUCTION

First I see second degree polynomial structure and second I see: if you know the coeffecient a of the second degree polynom you can calculate the future prime's Mersenne (Figures 1 and 2).

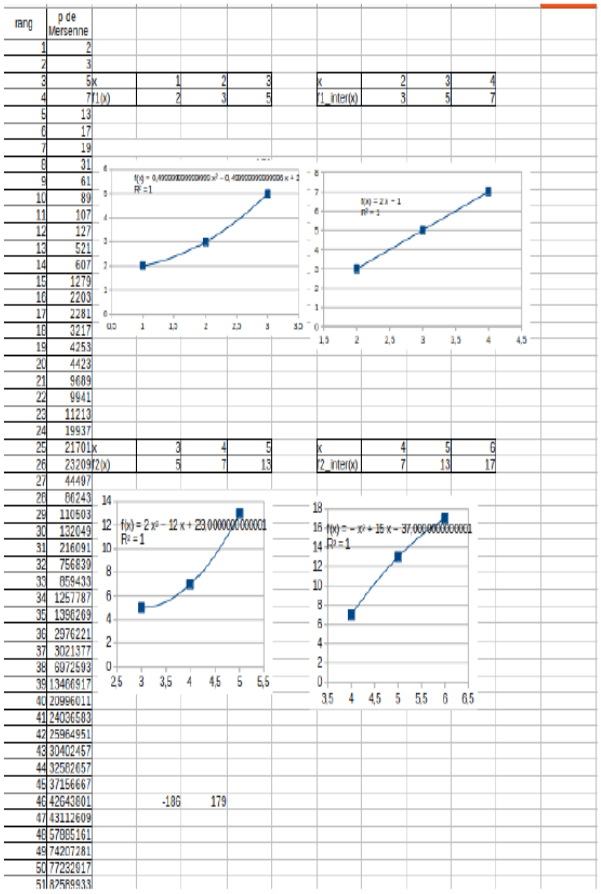

Figure 1) *Polynomial structure*

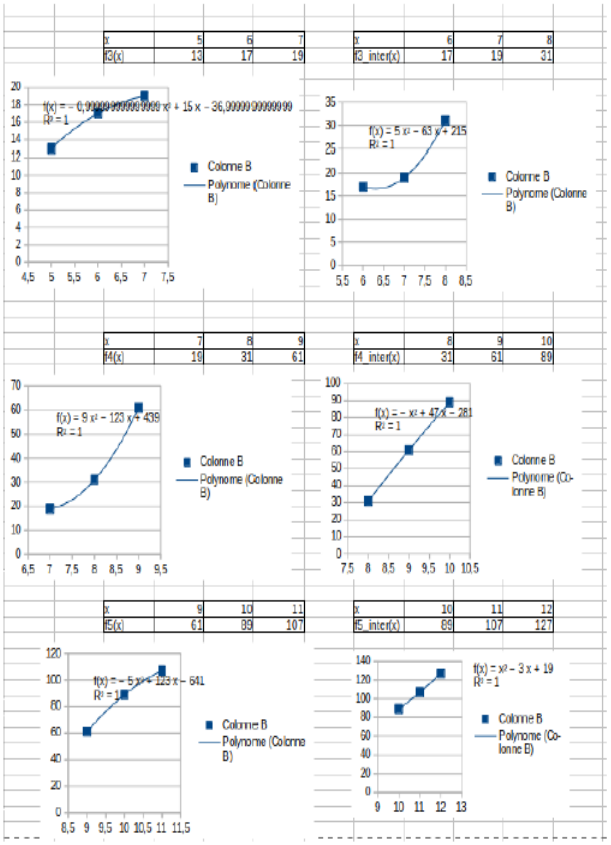

Figure 2) Second *polynomial structure*

Second I see: If you know the coeffecient a of the second degree polynom you can calculate the future prime's Mersenne

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Theorem 1: If a= 2 * [0, 2, -1, -1, 5, 9, -1, -5, 1, 187, -154, 293, 126, -423, 429, 50, -433, 2548, -2507, 510, 3726, -3480, -128, 9890, 10229, -8740, -1357, 31248, 228353, - 219077, 147880, -128936, 718735, -766398, 1953030, 1271554, 517385, -2244261, -556102, 1254569, -1128653, 1196905, 456562, -2509163, 7151872, 774784, -6648242, 1165690] then m[i+2] = a + 2 * m[i + 1] - m[i] with M[1] = 3 and M[2] = 5

Proof. Proofed with an algorithm and the verification that all 51 known Mersenne's Primes are found.

Algorithm to find the 15 first Mersenne's primes numbers

```
import gmpy2
from gmpy2 import mpz

nb_set=15 #number of merssenne to calculate

m = [0] * 51
m[1] = 3
m[2] = 5
a = 0
i = 1
m3 = a + 2 * m[i + 1] - m[i]
m[i + 2] = m3

for i in range(2,nb_set):
 a = 1
 k = 1
 m3 = a + 2 * m[i + 1] - m[i]

while (not gmpy2.is_prime(mpz('2')** abs(m3)-1) or m3 <= m[i + 1] or not gmpy2.is_prime(mpz(str(m3))))
        if k % 2 == 1:
            a = -a
        else:
            a = -a + 1
        k += 1
        m3 = a + 2 * m[i + 1] - m[i]

 m[i + 2] = m3

print([int(x) for x in m[1:nb_set+2]])
```

the script is here

CONCLUSION

This algorithm allow to find the 15 first Mersenne's primes but is limited by the condition
gmpy2.is_prime(mpz('2')** abs(m3)-1)
It will be for further research interesting to replace this condition by a Lucas Lehmer test.