Admissible Prime k tuples

By

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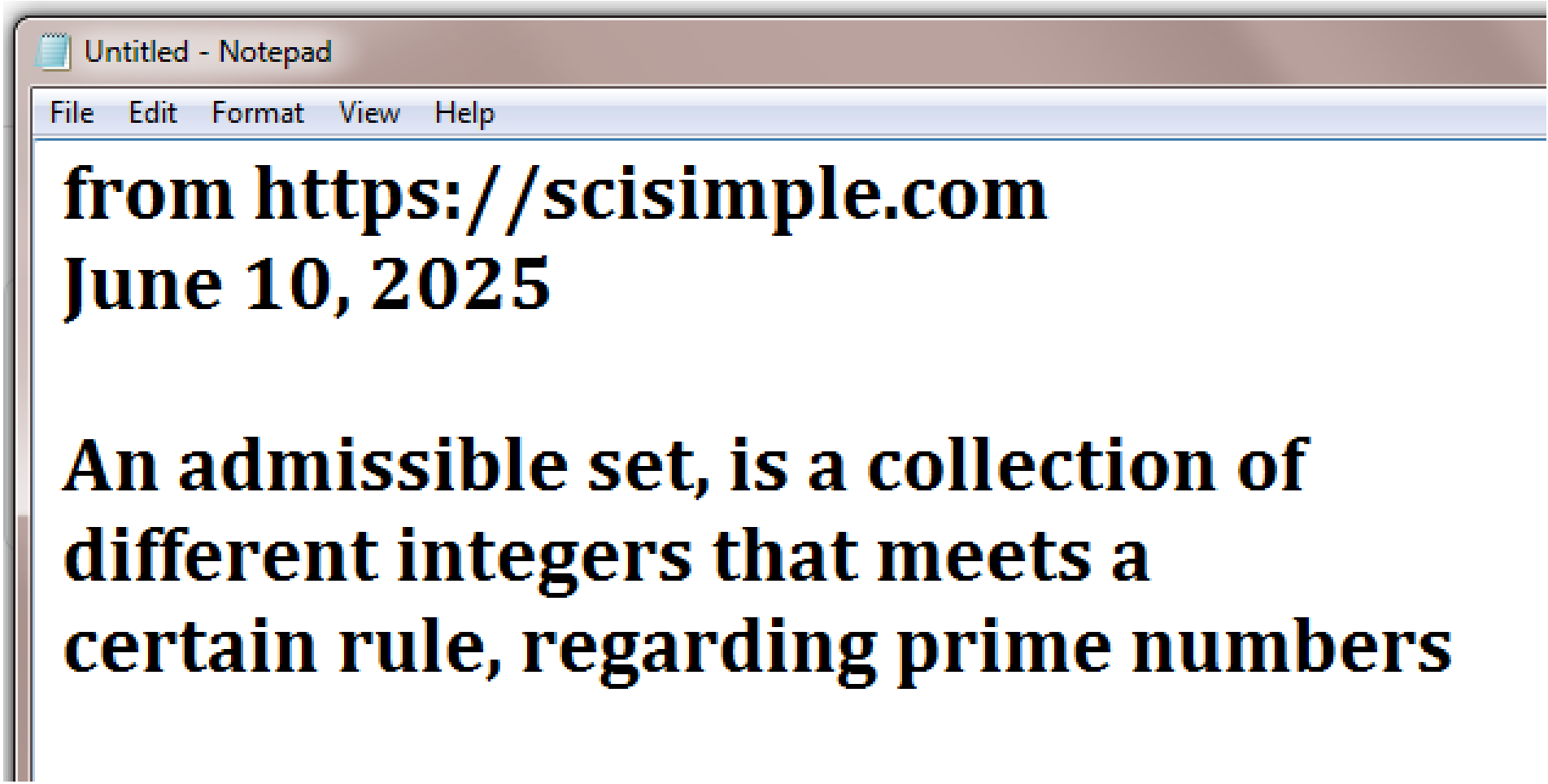
For sharing January 2026

First, a definition of simple set



Second thing is second

Assume you have a finite set of prime numbers

$Prime_{set} = \{p_1, p_2, p_3, \ldots, p_w\}$

so the count of $Prime_{set}$ is w.

Further, assume all these numbers are unique and sorted smallest to largest.

That is what we are talking about today !

What does admissible even mean?
It means, good enough!

A good cherub
[or even ghost or angel]

A set

assume n is a positive whole number

further, let “b” be a set with count n elements, so that |b|=n

also, let all the elements of “b” be prime numbers

without repetition, and sorted smallest to largest

just to make things interesting ☺

good times

“Simple” finite set

Suppose¶

A={p1,p2,p3,·…·,pn}¶

Is·a·set·of·prime·numbers¶

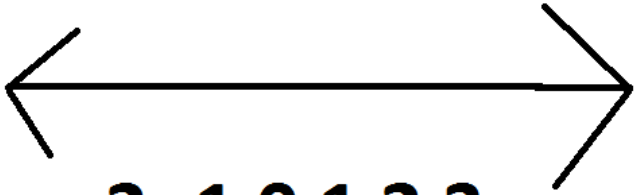
With·|A|·=·n¶

That·is,·the·count·of·the¶

Elements·of·our·set·is·n¶

Background, positive whole numbers

the whole numbers



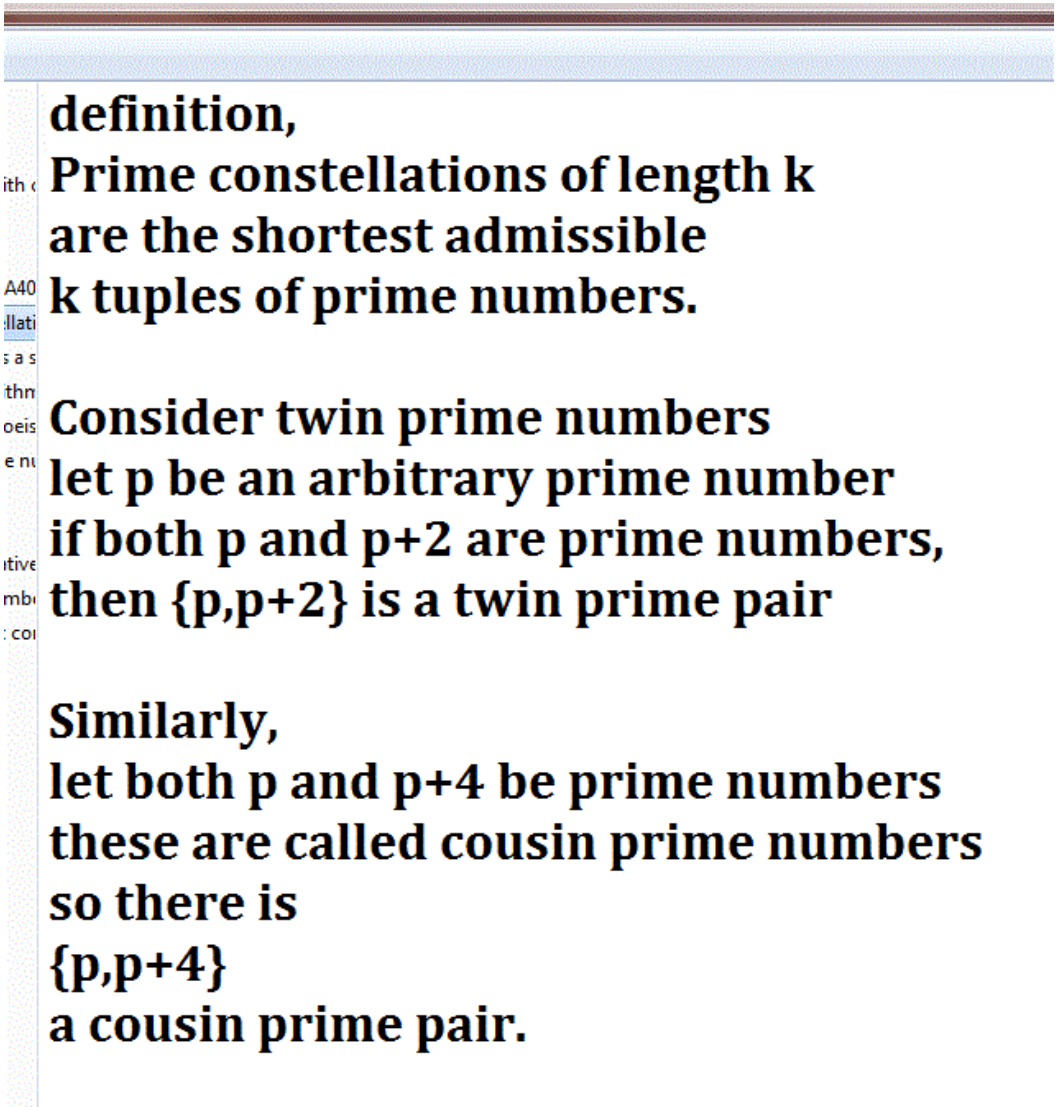
arrows for infinity

MCA

To get started

the first few prime numbers are
{2, 3, 5, 7, 11}

Prime constellations are cool says me ☺



definition,
Prime constellations of length k
are the shortest admissible
k tuples of prime numbers.

Consider twin prime numbers
let p be an arbitrary prime number
if both p and p+2 are prime numbers,
then {p,p+2} is a twin prime pair

Similarly,
let both p and p+4 be prime numbers
these are called cousin prime numbers
so there is
{p,p+4}
a cousin prime pair.

More cousin prime numbers

Prime numbers p such that both p and p+4
are prime numbers. A list from
https://oeis.org/A046132/ to wit

{3,7}
{7,11}
{13,17}
{19,23}
possibly an infinite list,
assuming the k tuple conjecture
In My Humble Opinion (IMHO) k tuple is true

The Online Encyclopedia of Integer Sequences, as a resource

(Greetings from The On-Line Encyclopedia of Integer Sequences!)

A000040 The prime numbers.
(Formerly M0652 N0241)

2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79,
137, 139, 149, 151, 157, 163, 167, 173, 179, 181, 191, 193, 197, 199, 211, 223, 227,
(list; graph; refs; listen; history; text; internal format)

OFFSET 1,1

COMMENTS See A065091 for comments, formulas etc. concerning only odd primes. Fo
A000961. For contributions concerning "almost primes" see A002808.

What is a k tuple?

From Chris Caldwell's prime pages,

https://t5k.org/

a quote

In mathematics, a k tuple is an ordered set of k values

(a vector of degree k)

$(a_1, a_2, \ldots, a_k)$

Some prime facts

- 2 is the smallest prime number.
- All prime numbers > 2 are odd numbers.
- All prime numbers greater than three have the form
  $p = 6*m \pm 1$
  that is for primes > 4,
  there is, for
  $p_{>4} = 1$ or 5 modulo 6.

The first few twin primes

{3,5} special form, because 3 is prime

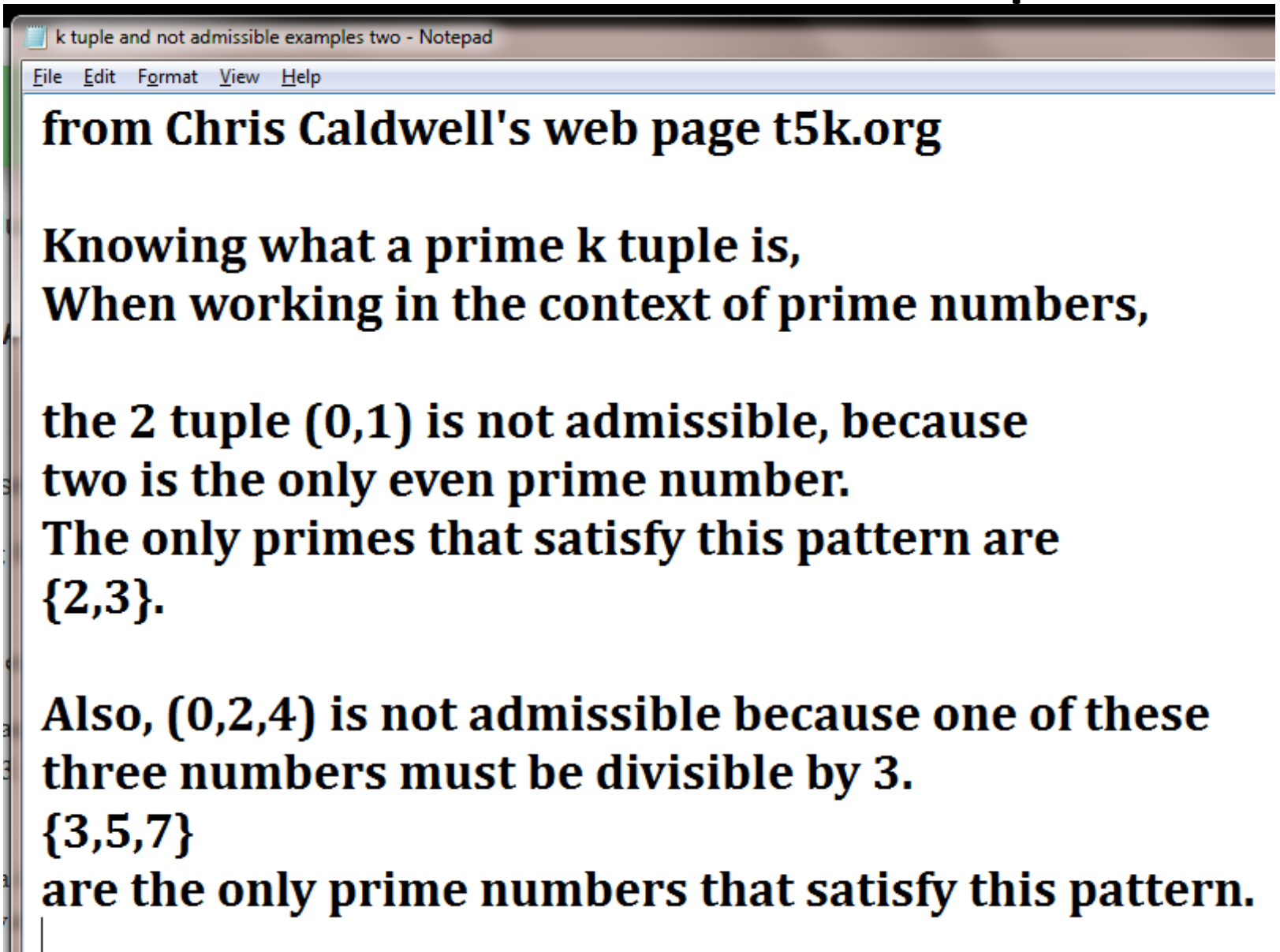
{5,7} twins around 6

{11,13} twins around 12

{17,19} twins around 18

And 25 is divisible by 5

Two not admissible examples



Closer to mathematically admissible

If a pattern is admissible,

And the k tuple conjecture is true,

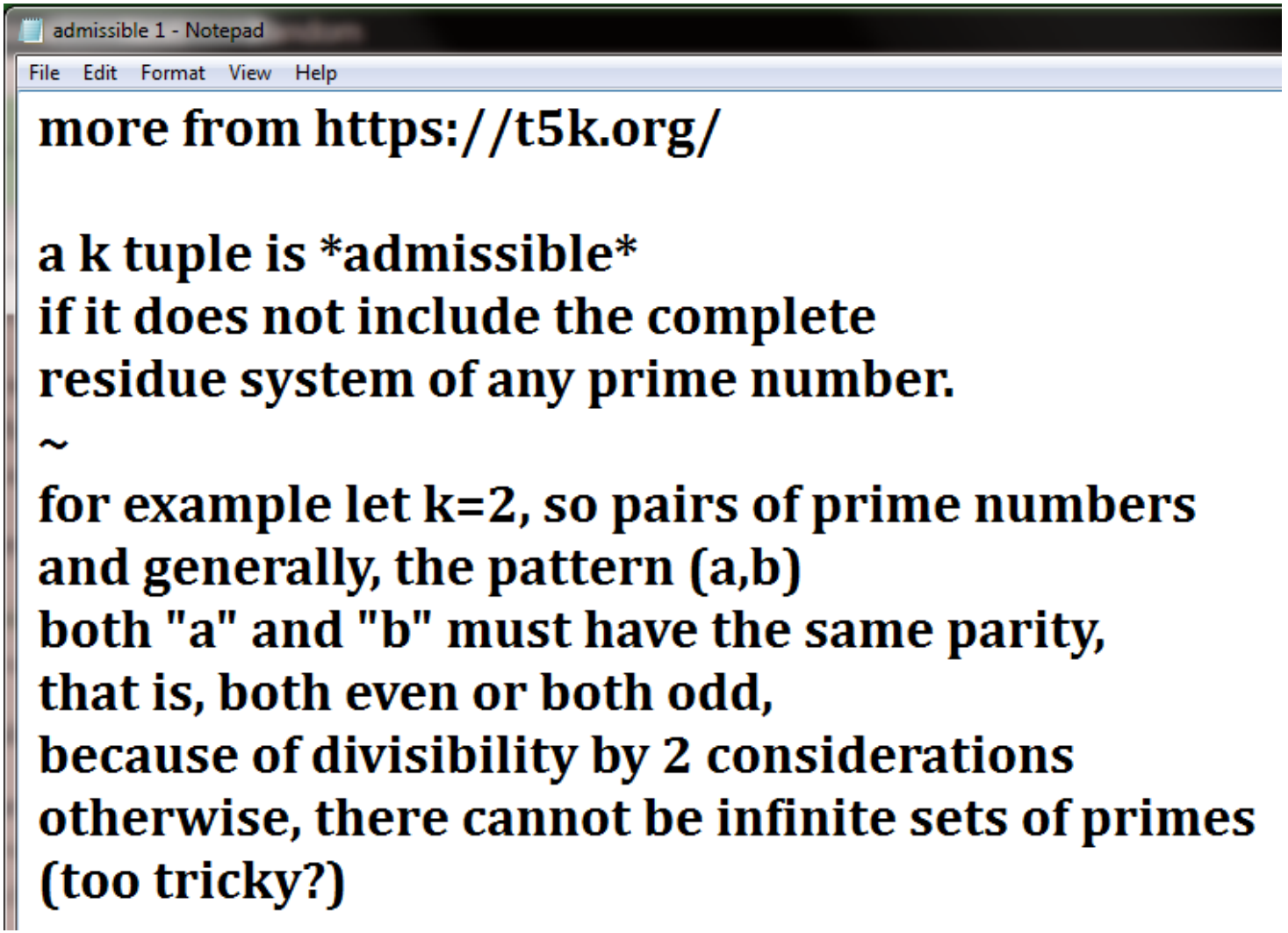
Then there will be infinitely many sets, s, of

Prime numbers that satisfy the given pattern.

And

$|s| = k$.

Admissible k tuple



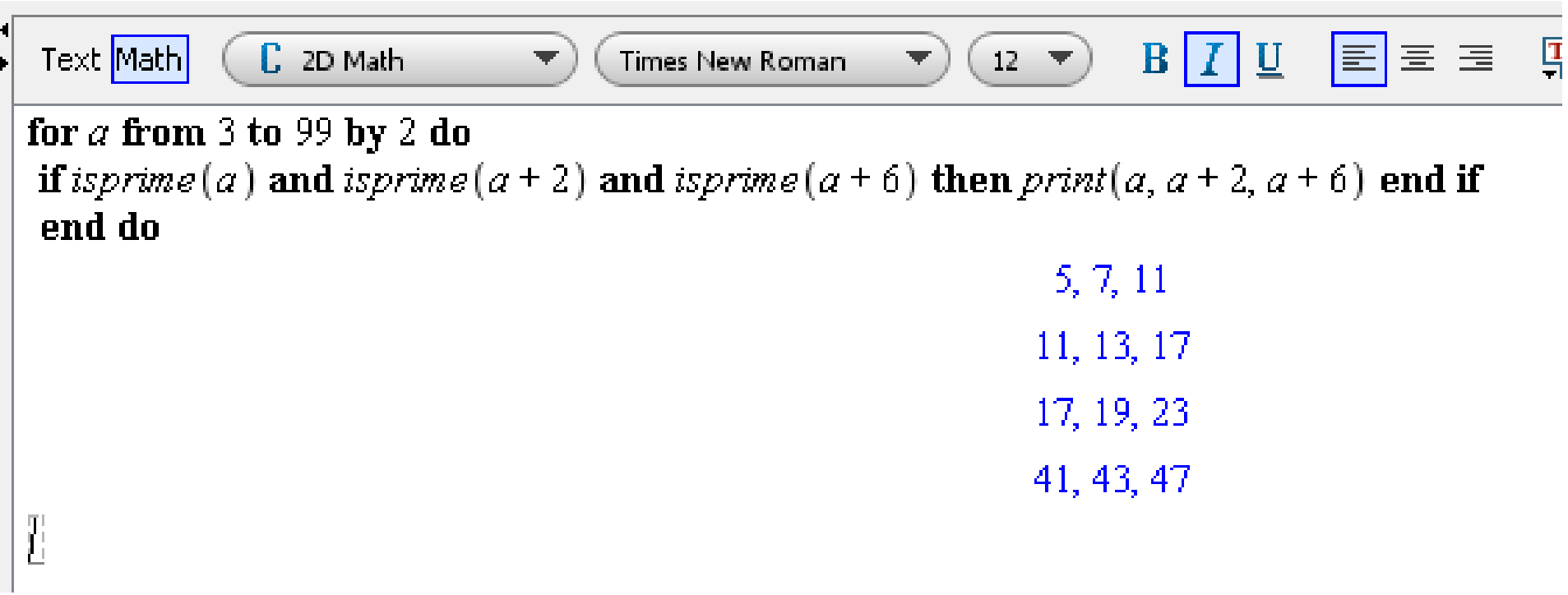
Another example

- Look at the pattern

(0,2,6)

There are , probably, infinitely many prime numbers that satisfy this pattern.

More on (0,2,6) pattern



These 4 sets of three prime numbers each are admissible, under the k tuple conjecture

admissible example

Finally, consider this 5 tuple
f=(5,7,11,13,17)

All the prime numbers ≤ 5 are

{2,3,5}

So must test division residues modulo {2,3, and 5}

All odd in f, so 2 is fine. Modulo 3 gives

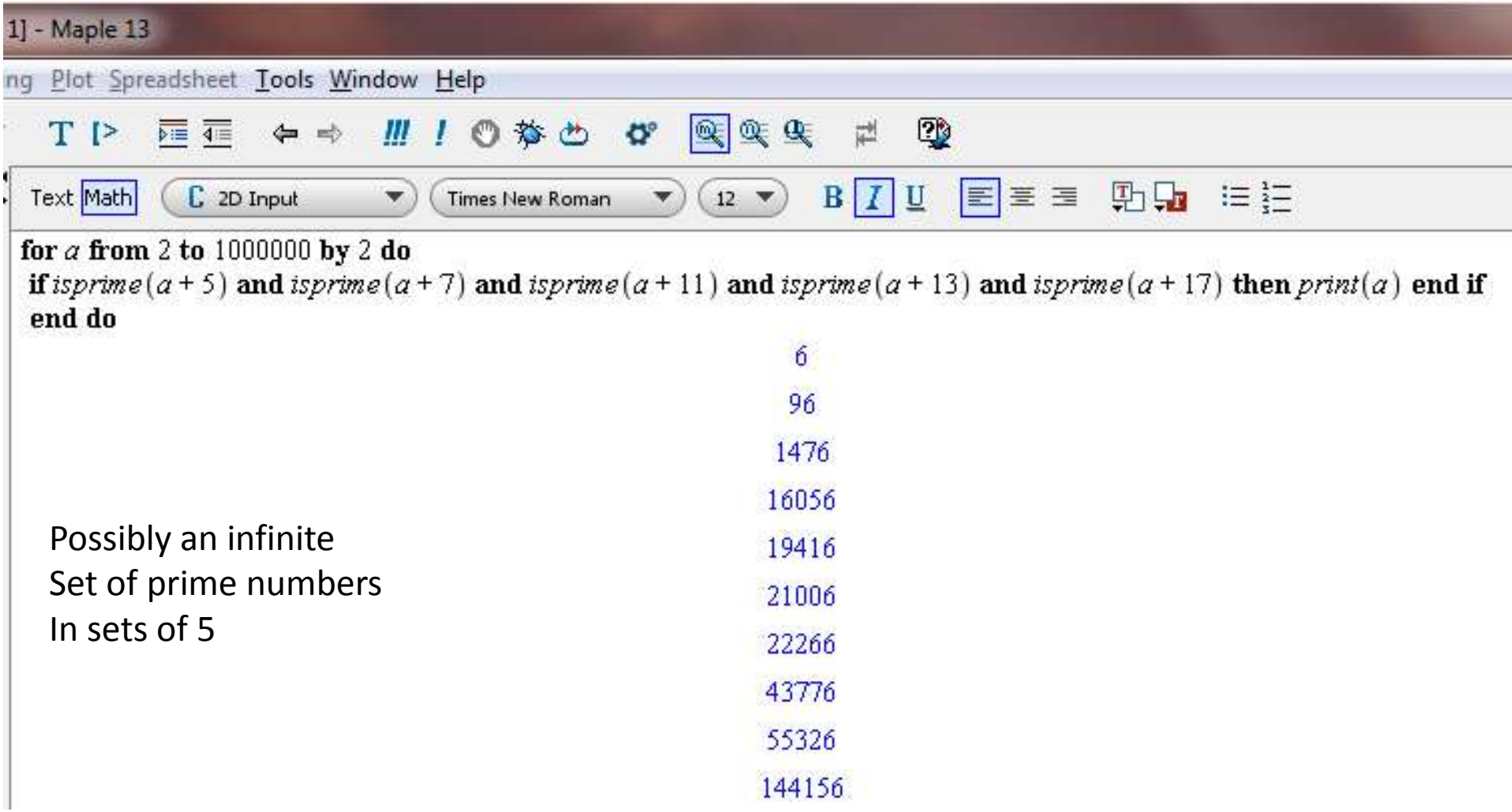
{2,1,2,1,2} so modulo 3 is fine, and

Modulo 5 gives {0,2,1,3,2} and this omits 4,

So f is definitely an admissible pattern

There might be infinitely many such prime sets

Let f=(5,7,11,13,17), as a pattern for prime numbers



Possibly an infinite
Set of prime numbers
In sets of 5

An oeis.org example of an admissible 5 tuples, with my name on it

Search Hints

(Greetings from The On-Line Encyclopedia of Integer Sequences!)

A022006 Initial members p of prime 5-tuples (p, p+2, p+6, p+8, p+12). 77

5, 11, 101, 1481, 16061, 19421, 21011, 22271, 43781, 55331, 144161, 165701, 166841, 195731, 201821, 225341, 247601, 268811, 326141, 347981, 361211, 397751, 465161, 518801, 536441, 633461, 633791, 661091, 768191, 795791, 829721, 857951, 876011, 958541

(list; graph; refs; listen; history; text; internal format)

OFFSET 1,1

COMMENTS Subsequence of A007530. - R. J. Mathar, Feb 10 2013
All terms, except for the first one, are congruent to 11 (modulo 30). - Matt C. Anderson, May 22 2015
For n > 1 and p = a(n), (p, p+2, p+6, p+8, p+12) are consecutive primes. - Zak Seidov, Jun 07 2017
A022007 is a similar sequence. - Wolfdieter Lang, Oct 06 2017

LINKS Dana Jacobsen, Table of n, a(n) for n = 1..10000 (terms 1..1000 from T. D. Noe, terms 1001..10000 from Matt C. Anderson)
J. K. Andersen, Prime Records.
Tony Forbes and Norman Luhn, Prime k-tuplets.
Norman Luhn, Table of n, a(n) for n = 1..1000000.

EXAMPLE Admissible 5-tuple guaranteeing sequence example: for prime(3) = 5 the first residue class starting with a nonnegative number and containing none of the members of (0, 2, 6, 8, 12) is 4 (mod 5). - Wolfdieter Lang, Oct 06 2017

Thank you

Thanks for watching and listening.

Safe travels

References

- Chris Caldwell's Prime pages https://t5k.org/
- Norma Luhn (Cybertronic on a forum.org) www.pzktupel.de\ktuplets.htm
- Matt C. Anderson (me) https://mattanderson.fun/