

sci.logic: corrected Infinitude of Primes proof; both direct and indirect methods

corrected Infinitude of Primes proof; both direct and indirect methods

Source: <http://sci.tech-archive.net/Archive/sci.logic/2005-03/1125.html>

From: Archimedes Plutonium (*a_plutonium_at_iw.net*)

Date: 03/29/05

Date: Tue, 29 Mar 2005 07:45:45 -0600

----- quoting a bit of the old File 106 of www.iw.net/~a_plutonium
regarding Infinitude of Primes proof -----

PART TWO: Euclid's Infinitude of Primes Proof, my correction
thereof

Note: All of these IP proof attempts by many authors have been posted to
Usenet

starting 1993-1994. This first one of 2SEP94 header is kept but all the
others are deleted to save space.

From: Ludwig.Plutonium@dartmouth.edu (Ludwig Plutonium)

Newsgroups: sci.math,alt.sci.physics.plutonium

Subject: G.H.HARDY, FAILS TO GIVE A VALID PROOF OF EUCLID'S IP

Date: 2 Sep 1994 01:19:25 GMT

Organization: Dartmouth College, Hanover, NH

Lines: 69

Message-ID: (345uit\$68n@dartvax.dartmouth.edu>

----- end quoting my old work -----

This is my latest up to date work:

Subject:

Re: Correcting the invalid proof attempts of Euclid's
Infinitude of Primes, both direct and indirect methods

Date:

Mon, 28 Mar 2005 12:10:56 -0600

From:

Archimedes Plutonium (*a_plutonium@iw.net*>

Reply-To:

NOiwEMAIL

Organization:

www.iw.net/~a_plutonium

Newsgroups:

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sci.logic, sci.math

References:

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>
> #####
> *** posted 1993–1994 proofs of Infinitude of Primes by Archimedes*
> *Plutonium ***
> *Valid proofs of Euclid's Infinitude of Primes*
> *Here is the valid Direct proof of IP*
> *Infinitude of Primes Proof, *DIRECT Method**
>
> (1) *Statement: Given any finite collection of primes $2,3,\dots,p_n$*
> *possessing a*
> *cardinality n Reason: given*
>
> (2) *Statement: we find another prime by considering $W+1 = (2 \times 3 \times \dots \times p_n)$*

> *+1*
> *Reason: can always operate on given numbers*
>
> (3) *Statement: Either $W+1$ itself is a prime*
> *Reason: numbers are either unit, composite or prime*
>
> (4) *Statement: or else it has a prime factor not equal $2,3,\dots,p_n$*
> *Reason: numbers are either unit, composite or prime*
>
> (5) *Statement: If p is not prime, we find that prime factor*
> *Reason: Unique Prime Factorization theorem*
>
> (6) *Statement: Thus the cardinality of every finite set can be*
increased
>
> *Reason: from steps (3) through (5)*
>
> (7) *Statement: Since all/any finite cardinality set can be increased*
by
> *1 more therefore the set of primes is an infinite set.*
> *Reason: going from the existential logical quantifier to the*
> *universal quantification*
>
> ####
>
> *Here is the valid Indirect proof of IP. (Using Hardy's terminology)*
> *Infinitude of Primes Proof, *INDIRECT Method**
>

Anyway here is a streamlined proof of IP indirect method:

Here is the valid Indirect proof of IP. (Using Hardy's terminology)
Infinitude of Primes Proof, *INDIRECT Method*

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(1) The prime numbers are the numbers $2, 3, \dots, p_n, \dots$ of set S

Reason: definition of primes

(2) Suppose finite, then $2, 3, \dots, p_n$ is the complete series set

Reason: supposition step

(3) Set S are the only primes that exist

Reason: from step (2)

Note: This step follows immediately from the "Suppose primes are finite".

And it is a very important step and because it is so much like the statement

"Suppose the set S of primes is finite", for it is this statement

"The set S is all the primes that exist".

And it is this step that disallows any other prime factor search once $W+1$

is

formed. $W+1$ is your only allowable prime candidate in the indirect method,

otherwise you are self-contradicting your

own logic. The math logic is supposed to get you the contradiction, not you, in your own illogic.)

(4) Form $W+1 = (2 \times 3 \times \dots \times p_n) + 1$

Reason: can always operate and form a new number

(5) Is $W+1$ prime? yes

Reason: Unique Prime Factorization theorem combined with the definition of what prime is.

(6) Contradiction

Reason: p_n was supposed the largest prime yet we constructed a new prime larger than p_n

(7) Reverse supposition step and primes are infinite

Reason: steps (1) through (6)

Also, one thing nice about this streamlined version is that it is the same

number of lines as the Direct proof method of 7 lines in all.

I would like for someone to render IP, both direct and indirect into purely

Symbolic Logic and see if both methods require the same number of lines of

proof.

Now there is nothing in mathematics to say that a valid direct method compared to a valid indirect method should end up with the same number of

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lines.

However, in Physics, a subject I am working on serendipitously today is

that of Principle of Least Action. And in an AtomTotality Physics has mathematics as a tiny subset. Physics is King and mathematics is a servant in the house of physics.

So a principle of Least Action may state that every proof in mathematics

such as Infinitude of Primes when written out in Symbolic Logic must have the same number of lines for the Direct Method as well as the Indirect Method.

Do I believe it true? Honestly I do not. I believe the Principle of Least Action would make the Direct and Indirect come close together in number of lines but not force them to be equal. A good test experiment is to get a proof that is widely disparate between direct and indirect written in Symbolic Logic.

I am going to change the proof of IP indirect method on my website of www.iw.net/~a_plutonium to this streamlined version.

In the indirect IP the focus of attention is the fact of P_n being the largest prime and so the instant P_{n+1} is formed it is also prime but larger than P_n which yields the contradiction. I could talk about P_{n+1} as composite and prime simultaneously yielding the contradiction, but the focus at the beginning of the proof was P_n was the largest prime and yields the contradiction faster. So in a Symbolic Logic write up of Euclid's Infinitude of Primes indirect method I believe the number of lines is shortened with the Contradiction yielded from the new prime larger than the old prime P_n .

But I suspect that Euclid's IP is not easy, perhaps even impossible to write up in terms of Symbolic Logic. I suspect this to be the case because then that would explain why MathWorld and over half of college and University professors of mathematics fail in writing a logically sound IP proof. I suspect something is not transferrable to Symbolic Logic. And that a Symbolic Logic write up of IP would not be a short 7 lines but more like

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several hundreds of lines. Maybe it is writeable in Symbolic Logic but
all
mathematicians to date were too lazy to perform the task.

Archimedes Plutonium

www.iw.net/~a_plutonium

whole entire Universe is just one big atom where dots
of the electron-dot-cloud are galaxies