Proofs: P<NP| Riemann Conjecture|

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Abstract:

The following is a collection of two proofs, submitted in 21 March 2021.Methods used in each proof: PNP – set theory, calculus of variations and category theory. Riemann conjecture – differential topology, group theory, calculus of variations and category theory. Using those methods on the Riemann conjecture yield an astonishing insight – primes form a non-abelian group with one condition regarding addition.

Introduction

$P < NP$

Let it be a set -

$$A = \{a(1) \ldots . a(n)\} \qquad (1)$$

Define a condition on the set:

$$K: A \rightarrow B \qquad (2)$$

Let $B = \{a(1) \ldots . a(m)\}$ a subset of A which satisfy the condition K.

$$m < n.$$

Allocate:

.

$$K \rightarrow t(1) \qquad (3)$$

Time in which the subset B was obtained after running the condition. Allow the elements of A to vary over time.

$$\Delta t: A \rightarrow A' \qquad (4)$$

$$\Delta t: B \rightarrow B' \qquad (5)$$

Let an isomorphism exit between the sets after the operation Δt. Define a functor on the subset B:

$$V: \text{set} \rightarrow \text{Top} \qquad (6)$$

In order to obtain an EL equation of the subset L (B, B', t) on a topological space. Set the space to be complex analytical to ensure differentiation is possible at all time.

$$\frac{\partial \mathbf{L}}{\partial \mathbf{B}} - \frac{\partial \mathbf{L}}{\partial \mathbf{B}'} * \frac{\mathbf{d}}{\mathbf{dt}} = \mathbf{0} \qquad (7)$$

Or

$$\mathrm{B} - \mathrm{B}' * \Delta \mathrm{t} = 0. \qquad (8)$$

Since we allocated to obtaining the subset B the time $\mathrm{t}(1)$ – we can write:

$$(\mathrm{t}(1))\mathrm{B} - \mathrm{B}' * (\mathrm{t}(1) + \Delta \mathrm{t}) = 0 \qquad (9)$$

For a given condition we impose on a set, which yield a subset to satisfy it, in order to ensure the subset to be a valid solution we are required to examine it will stay invariant under time translations after we operate a functor on it and switch to a topological space.

In other words, the variations of the subset to vanish at border. One can say that the subset has to be close with respect to time.

Thus, time obtaining a suggested solution will always to shorter than the time required deciding the existence of a solution The time of making a decision regarding the existence of a solution and obtaining the solution will be equal if the set is not varying over time. $\Delta \mathrm{t} = 0$.

End of prove.

Riemann Conjecture

Define a Lorentz manifold

$$\mathbf{s} = (\mathbf{M}, \mathbf{g}) \qquad (1)$$

Use it to assemble a Lagrangian and require it to be stationary:

$$\mathrm{L} = (\mathrm{s}, \mathrm{s}', \mathrm{t}) \qquad (2)$$

$$\frac{\partial \mathbf{L}}{\partial \mathbf{s}} - \frac{\partial \mathbf{L}}{\partial \mathbf{s}'} * \frac{\mathbf{d}}{\mathbf{dt}} = \mathbf{0} \qquad (3)$$

Allow arbitrary variations of the manifold. Ensure it will vanish:

$$\varpi\mathbf{s} = 0$$

Turn it to a series of arbitrary variations:

$$\varpi\mathbf{s} = \varpi\mathbf{s1} + \varpi\mathbf{s2} + \varpi\mathrm{s}3 \ldots \qquad (4)$$

If there are only four elements in the series, and we require them all to vanish, than we can allocate two pluses and two minuses:

$$\varpi\mathbf{s1} + \varpi\mathbf{s3} > 0$$

$$\varpi\mathbf{s2} + \varpi\mathbf{s4} < 0$$

If

$$\varpi\mathbf{s1} + \varpi\mathbf{s3} + \varpi\mathbf{s2} + \varpi\mathbf{s4} \neq 0 \qquad (5)$$

Than the overall series cannot vanish, by that logic we need equal amounts of plus and minuses. The overall amount must be even and summed as zero.

Suppose that we had three distinct elements, two pluses and minus:

$$> 0\varpi\mathbf{s1} + \varpi\mathbf{s3} + \varpi\mathbf{s2}$$

or

$$\varpi\mathbf{s1} + \varpi\mathbf{s3} + \varpi\mathbf{s2} < 0$$

Demanding the series to vanish this forbid this result, and so there could not be three distinct elements in the series, else the overall series will not vanish. As a result of those sceneries, we require the series to have an even amount of variation elements, manifesting as two distinct elements in the series, which differ in sign.

If we allow those sub elements in the series to vary as well, and by the above reasoning, there are only two elements in the series, they are varying in a discrete way, or forming a group. Let it be only four elements in the series and one of the pluses just changed its nature

$$\mathbf{O}: \varpi\mathbf{s1} \rightarrow \varpi\mathbf{s2}$$

$$\varpi\mathbf{s1} + \varpi\mathbf{s1} + \varpi\mathbf{s2} + \varpi\mathbf{s2} = 0$$

To:

$$\varpi\mathbf{s1} + \varpi\mathbf{s2} + \varpi\mathbf{s2} + \varpi\mathbf{s2} \neq 0$$

There must be a way to bring it back to where it was, so the overall series can vanish, it takes another map, on the varying element to bring it back to where it was.

$$\text{Y}: \varpi\mathbf{s2} \rightarrow \varpi\mathbf{s1}$$

Therefore, to bring an element to itself given only two varying elements in the series we need two distinct maps, which attach a varying element to itself, by a threefold combination. $\varpi\mathbf{s1}(\text{O})\ \varpi\mathbf{s2}(\text{Y})\ \varpi\mathbf{s1}$ For example.

Even though the sub elements in the series are varying, the overall series can vanish.

Now, count all the ways of possible combinations of those elements. We are going to analyze by the integral signs. Since it is a group, there is a natural map, which change an element to itself. One built his analysis firstly on those natural maps.

$$(1(\text{e})1(\text{e})1)$$

$$2(\text{e})2(\text{e})2$$

$$(221)$$

$$(112)$$

$$(211)$$

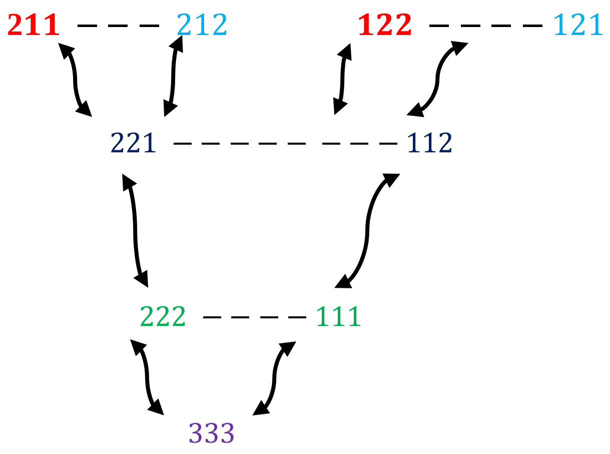
$$(122)$$

$$(212)$$

$$(121)$$

The first two combinations are by the natural maps and one used them to build the other combinations. Overall, there are eight such combinations and additional one arrow combination, which yield (333)

Here is how one built it, starting from those two natural maps. (Arrows to variations, colors to pairings):



Now that we have a series of 2N elements, varying to one another and forming threefold combinations, **which we require to vanish at end**, we can set the stage for a proof of primes:

Define: P^m as the set of {2 , 3} as "minimal primes"

In addition, all the other primes to be in a set of $P_{\underline{h}}$ as meant "prime higher".

Define $P_{\underline{h}} = \{2n + 1\}$ not divisible by P^m as "prime higher" set – 2n taken as amount of Lorentz manifold arbitrary variations.

$\{2n + 1\}$ as an odd amount of variations not divisible by minimal primes

$$P_{\underset{\wedge}{t}} = P_{\underline{h}} + P^m \text{; to be the set of all primes}$$

.

Define a functor V on $P_{\underline{h}}$:

$$V: \text{set} \rightarrow \text{ring} \qquad (6)$$

Analyze any multiplication or addition combination of $P_{\underline{h}}$ on the ring. Let the ring exist on a Lorentz manifold, a topological space.

Multiplication:

Define T to be a number aspiring infinity: T→ ∞ Multiply an **even or odd** series aspiring infinity of distinct higher primes to obtain:

$$[(2n_1+1)(2n_2+1)(2n_3+1)\ldots(2n+1]) =$$

$$2\left[T\left((n_1\ n_2 \ldots)\right) + (n1+n2+n3\ldots) + \frac{1}{2}\right]$$

$$= 2([T((n1\ n2\ldots)) + N(s) + 1/2]$$

$$N(s) = (n1+n2+n3\ldots) = 0 \qquad (7)$$

As sums of even amounts of arbitrary variations vanish. Since all the elements are two multiples, they all vanish. Final form:

$$2\left([T(n1\ n2\ldots)] + \frac{1}{2}\right) \qquad (8)$$

Addition

Add any infinite **even series** of distinct higher primes to obtain

$$(2n_1+1) + (2n_2+1) + (2n_3+1)\ldots = [2(n1+n2\ldots) + \text{even}] =$$

$$[2(n1+n2\ldots)] \qquad (9)$$

$$\text{as even} = 0.$$

Prime cannot form, as even amount of variations vanish exactly to zero. That is the reason the paper begins with deriving fermions, their anti-commutation relation. Even amount of distinct higher primes added will never form a prime.

Add any infinite **odd series** of distinct higher primes to obtain

$$(2n_1+1) + (2n_2+1) + (2n_3+1)\ldots =$$

$$[2(n1+n2\ldots) + \text{odd}] =$$

$$[2(n1+n2\ldots) + (\text{even} + 1)] \qquad (10)$$

However, even amounts of arbitrary variations vanish:

$$\text{even} = 0$$

$$[2(\text{n1} + \text{n2} \ldots) + 1] \text{ or:}$$

$$2[\text{n1} + \text{n2} \ldots + 1/2] \qquad (11)$$

Category transformations

Define a functor on "Primes higher" ring

$$\text{G: ring} \rightarrow \text{group}$$

All "primes higher" are forming a closed non-abelian group with 1/2 as generator. The condition to group forming is to have an odd amount of primes under addition and eliminating even amounts of arbitrary variations taken as an axiom.

Define additional functor

$$\text{G}': \text{group} \rightarrow \text{set}$$

Add the sets:

$$P_{\underline{h}} + P^{m} = P_{\hat{t}} \;;$$

Define a functor on $P_{\hat{t}}$:

$$\text{G}'': \text{set} \rightarrow \text{group}$$

All primes are forming a non-abelian group of generator 1/2. Minimal primes are part of the group by nature of the proof, defined technically to be prime.

Primes are forming a non-abelian group under addition and multiplication. The condition to satisfy is to have an odd amount of primes under operation of addition. No matter how far into infinity we will go, the framework of vanishing of even amount of variations will ensure that all primes take the same form – aligned on $\frac{1}{2}$.

Setting the stage and **examining primes not as numbers**, **but rather as arbitrary variations of a manifold**, which vanish in pairs of even variations, we are able to show primes to form a non-abelian closed group under 2(n+1/2). Final functor on the total group of primes:

Riemann: Group → ring

All primes are forming an infinite ring on the critical line of 1/2 and only there.

$$\boldsymbol{End\ of\ proof.}$$

The reasoning for choosing the numbers of "prime minimal" is due to the nature of fermions, which yield a series of two distinct elements in threefold combinations. Fermions behave according to an anti- commutation relation and vanish in pairs.

There could not be a "quark" or an arbitrary variation of the manifold by itself. The series must be two and three divisible. Even amounts of opposite signs and threefold combination of elements.

Overview of reasoning

1. Deriving fermions as arbitrary variations of a Lorentz manifold

2. Arbitrary variations to vary to form threefold combinations

3. Using the fact that arbitrary variations must vanish – to derive their pairing.

Threefold combinations pairs in color.

4. Defining a prime in a context of variations – knowing that even amount of variations cancel.

5. Changing the setting from sets to rings – so we can operate addition and multiplication

6. Showing that under any multiplication – (1/2) will be invariant

7. Showing that under addition – only odd amount of primes will ensure a prime,

as even amounts of variations vanish. thus, could not be a prime there.

8. Changing the settings from ring to group, from group to set, adding minimal primes,

from set to group again, and group to ring.

Important note: not every odd combination of distinct higher primes will yield prime. Certain cases will yield an odd. However, that does not diminish the beautiful result Obtained, as every distinct higher prime will be formed as a combination of odd higher Primes Of lower magnitude. Primes are forming non Abelian group of the above form.

References

[1] O. Manor. "Proof: P$\leq NP$ Using EL Equation" In: (2021)

[2] O. Manor. "Proving The Riemann Hypothesis Using QFT and Differential Topology" In: (2021)