**Original article**

**Proof of the Riemann hypothesis**

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**Abstract**

I could give a complete proof by the number theory method to Riemann hypothesis. I found the following number law. This proved that Riemann hypothesis is correct. The formula is (1).

\[
\sum_{n=1}^{\infty} \frac{1}{n^s} = s = a + bi \tag{1}
\]

\[
\sum_{n=1}^{\infty} \left[ \frac{\sin(x \ln(2n - 1))}{(2n - 1)^c} - \frac{\sin(x \ln(2n))}{(2n)^c} \right] = b = x, \quad a = c = 0.5 \tag{3}
\]

Although x is treated as a real number, x is a nontrivial zero values.

That is, it takes eternal number of nontrivial zeros of the positive and negative regions on the axis 0.5.

And, \(\sin\) can be replaced with \(\cos\).

**introduction**
Looking at the formula of Euler's formula (1), I sought out if this could be handled as a cross series, and came to the formula (3). But that was an extremely difficult road. We continued calculations on WolframAlpha taking nontrivial zeros and taking into account cross series that converge to zero. It took several months to finish it, and when I gave it up, it was done.

This may be cos instead of sin, but I used sin.

The formula before reaching (3) was
\[ \frac{\cos[x\ln(2x-1)]}{(2x-1)^c} - \frac{\cos[x\ln(2x)]}{(2x)^c} \]
As a result, I sought to prove that nontrivial zeros could be proved to exist on the axis with the axis at 0.5.

From this figure, I thought that the proof was possible. However, this was also difficult.

These expressions may have been accidentally generated from a mistype during calculations using WolframAlpha. However, it is more correct to say that it occurred during the calculation considering the cross series which has nontrivial zeros and converges to 0.
discussion

\[
\left( \frac{\sin(x \ ln(2n-1))}{(2n-1)^c} \right) + \left( \frac{\cos(x \ ln(2n-1))}{(2n-1)^c} \right)
\]

\[= 2^{(-c)}n^{(-c)} \cdot (\sin(x \ ln(2n-1)) + \cos(x \ ln(2n-1)))
\]

\[(5)^2 = 2^{(-2c)}n^{(-2c)} \cdot (\sin^2(x \ ln(2n-1)) + 2^{(-2c)}n^{(-2c)} \cdot \cos^2(x \ ln(2n-1)))
\]

\[= 2^{(-2c)}n^{(-2c)} \left( \sin^2(x \ ln(2n-1)) + \cos^2(x \ ln(2n-1)) \right)
\]

\[= 2^{(-2c)}n^{(-2c)} \left( \sin^2(x \ ln(2n-1)) + \cos^2(x \ ln(2n-1)) \right) = 1
\]

\[= 2^{(-2c)}n^{(-2c)}
\]

\[= n^{(1 - 2c)} / (4^{c^*}(1 - 2c))
\]

\[
\lim_{c \to 0.5^+} \frac{n^{1-2c}}{4^c(1 - 2c)} = \infty
\]

\[
\lim_{c \to 0.5^-} \frac{n^{1-2c}}{4^c(1 - 2c)} = -\infty
\]

\[=(5)^2
\]

That is, at this time \(c=0.5\), \(x\) can take an infinite number of nontrivial zeros.

when \(c \neq 0.5\)

\[2^{(-2c)}n^{(-2c)} = n^{(1 - 2c)} / (4^{c^*}(1 - 2c)) \neq 0,
\]

\(x\) of \(5\) can not be taken nontrivial zeros.

The proof is completed.
Examples

(chapter 1)

\[\sum_{n=1}^{1000} \frac{\cos[14.1347\ln(2n-1)]}{(2n-1)^{0.49}} - \frac{\cos[14.1347\ln(2n)]}{(2n)^{0.49}} \approx -0.0287246146425618261\]

(Following, depending on LibreOffice)

[10000] = -0.01824124
[100000] = -0.01772770.....not converge

\[\sum_{n=1}^{1000} \frac{\cos[14.1347\ln(2n-1)]}{(2n-1)^{0.5}} - \frac{\cos[14.1347\ln(2n)]}{(2n)^{0.5}} \approx -0.00906301367133582151\]
\[ \sum_{n=1}^{1000} \{ \cos[14.1347 \ln(2n-1)]/(2n-1)^{0.51} - \cos[14.1347 \ln(2n)]/(2n)^{0.51} \} \approx 0.01024008264902787325 \]

\[ \sum_{n=1}^{1000} \{ \cos[21.022 \ln(2n-1)]/(2n-1)^{0.49} - \cos[21.022 \ln(2n)]/(2n)^{0.49} \} \approx -0.01007762395792851438 \]
\[
\sum_{n=1}^{1000} \left( \cos[21.022 \ln(2n-1)]/(2n-1)^{0.5} - \cos[21.022 \ln(2n)]/(2n)^{0.5} \right) \approx 0.010203050972979707
\]

\[
\begin{align*}
[10000] &= 0.0006418417 \\
[100000] &= 0.0010810057 \\
[1000000] &= 0.0002273394 \ldots \ldots \text{converge or Undecidable}
\end{align*}
\]

\[
\sum_{n=1}^{1000} \left( \cos[21.022 \ln(2n-1)]/(2n-1)^{0.51} - \cos[21.022 \ln(2n)]/(2n)^{0.51} \right) \approx 0.0301437250660519783
\]
In the following case, the disappearance of the tendency to converge to 0 is clear. If switch to cos instead of sin, the disappearance of the tendency to converge to 0 is clear.

\[(14.134725142 - 0.01 = 14.124725142)\]
(14.134725142 is nontrivial zero value.)
\[
\sum_{n=1}^{1000} \left\{ \sin[14.124725142 \times \ln(2n-1)]/(2n-1)^{0.5} - \sin[14.124725142 \times \ln(2n+1)]/(2n+1)^{0.5} \right\} \\
\approx -0.0117526548114588082337270114\ldots
\]

\[[10000] = -0.000695868\]
\[[100000] = 0.000047410\]
\[[1000000] = -0.000126710\ldots\text{Undecidable}\]
It also seemed to tend to converge to 0, but since it was difficult to distinguish, programming was used.

\[(14.1347-0.001=14.1337)\]
\[\sum_{n=1}^{1000}\left\{ \sin[14.1337 \ln(2n-1)]/(2n-1)^{0.5} - \sin[14.1337 \ln(2n+1)]/(2n+1)^{0.5} \right\} \approx -0.013021640483471921010915\]

\[10000]= -0.00155655 \]
\[100000]= 0.00162767 \]
\[1000000]= 0.00219388 \ldots \] not converge

\[(14.1347+0.001=14.1357)\]
\[\sum_{n=1}^{1000}\left\{ \sin[14.1357 \ln(2n-1)]/(2n-1)^{0.5} - \sin[14.1357 \ln(2n+1)]/(2n+1)^{0.5} \right\} \approx -0.013296375957240665437150144\]

\[10000]= -0.0054542 \]
\[100000]= -0.0022251 \]
\[1000000]= -0.0016713 \ldots \] Undecidable
It also seemed to tend to converge to 0, but since it was difficult to distinguish, programming was used.

\[(21.02204-0.001=21.02104)\]

\[
\sum_{n=1}^{1000} \left\{ \sin[21.02104 \ln(2n-1)]/(2n-1)^{0.5} - \sin[21.02104 \ln(2n+1)]/(2n+1)^{0.5} \right\} \approx -0.0093566149247315244857803
\]

\[100000]= \; 0.00325745
\[1000000]= \; 0.00317458 \ldots \ldots \text{not converge}

It also seemed to tend to converge to 0, but since it was difficult to distinguish, programming was used.

\[(21.02204 \text{ is nontrivial zero value.})\]

\[
\sum_{n=1}^{1000} \left\{ \sin[21.02204 \ln(2n-1)]/(2n-1)^{0.5} - \sin[21.02204 \ln(2n+1)]/(2n+1)^{0.5} \right\} \approx -0.009202016305808025659345
\]

\[100000]= \; 0.0001547
\[1000000]= \; 0.0000925 \ldots \ldots \text{converge}

It also seemed to tend to converge to 0, but since it was difficult to distinguish, programming was used.

\[(21.02204+0.001=22.02304)\]

\[
\sum_{n=1}^{1000} \left\{ \sin[21.02304 \ln(2n-1)]/(2n-1)^{0.5} - \sin[21.02304 \ln(2n+1)]/(2n+1)^{0.5} \right\} \approx -0.009046885984819371695009758
\]
\[ \sum_{n=1}^{1000} \frac{\sin[25.009857\ln(2n-1)]}{(2n-1)^{0.5}} - \frac{\sin[25.009857\ln(2n+1)]}{(2n+1)^{0.5}} \]
\[= -0.022338179083665032815839131\ldots \]
\[ [100000]= -0.0022922 \]
\[ [1000000]= -0.0019922 \ldots \text{not converge} \]

It also seemed to tend to converge to 0, but since it was difficult to distinguish, programming was used.

\((25.010857 - 0.001 = 25.009857)\)
\[ \sum_{n=1}^{1000} \frac{\sin[25.009857\ln(2n-1)]}{(2n-1)^{0.5}} - \frac{\sin[25.009857\ln(2n+1)]}{(2n+1)^{0.5}} \]
\[= -0.022338179083665032815839131\ldots \]
\[ [100000]= -0.0022922 \]
\[ [1000000]= -0.0019922 \ldots \text{Undecidable} \]
(25.010857 is nontrivial zero value.)

It also seemed to tend to converge to 0, but since it was difficult to distinguish, programming was used.

\[
\sum_{n=1}^{1000} \left( \frac{\sin[25.010857 \ln(2n-1)]}{(2n-1)^{0.5}} - \frac{\sin[25.010857 \ln(2n+1)]}{(2n+1)^{0.5}} \right) \\
\approx -0.02232576107447453052996263545\ldots\ldots
\]

\[100000]= 0.0008545\]

\[1000000]= 0.0003545\ldots\ldots\text{converge}\]

It also seemed to tend to converge to 0, but since it was difficult to distinguish, programming was used.

\((25.010857+0.001=25.011857)\)

\[
\sum_{n=1}^{1000} \left( \frac{\sin[25.011857 \ln(2n-1)]}{(2n-1)^{0.5}} - \frac{\sin[25.011857 \ln(2n+1)]}{(2n+1)^{0.5}} \right) \\
\approx -0.022316414234906088164579
\]

\[100000]= -0.0019695\]

\[1000000]= -0.0014695\ldots\ldots\text{Undecidable}\]
References

3. Toshiro Takami, Simulation of Nontribial Zero Point of Riemann Zeta Function. viXra: 1901.0432
I am a psychiatrist now and also a doctor of brain surgery before.

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I would like to receive an email. I will not answer the phone.

Currently 57 years old. Born on November 26, 1961

(Home)

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(postscript)

Prize money for my son and daughter.
I am poor of english.