Abstract

\[\sum_{n=1}^{\infty} \left[ \frac{\cos(x \ln(2n-1))}{(2n-1)^{0.5}} - \frac{\cos(x \ln(2n))}{(2n)^{0.5}} \right] = 0 \quad (1)\]

\[\sum_{n=1}^{\infty} \left[ \frac{\sin(x \ln(2n-1))}{(2n-1)^{0.5}} - \frac{\sin(x \ln(2n))}{(2n)^{0.5}} \right] = 0 \quad (2)\]

\[(1) + (2) = \sum_{n=1}^{\infty} \sqrt{2} \left[ \frac{\sin\left(\frac{\pi}{4} + x \ln(2n-1)\right)}{(2n-1)^{0.5}} - \frac{\sin\left(\frac{\pi}{4} + x \ln(2n)\right)}{(2n)^{0.5}} \right] = 0 \quad (3)\]

\[(1) - (2) = \sum_{n=1}^{\infty} \sqrt{2} \left[ \frac{\sin\left(\frac{\pi}{4} - x \ln(2n-1)\right)}{(2n-1)^{0.5}} - \frac{\sin\left(\frac{\pi}{4} - x \ln(2n)\right)}{(2n)^{0.5}} \right] = 0 \quad (4)\]

\[\sum_{n=1}^{\infty} \left[ \left( \frac{\sin(x \ln(2n))}{(2n)^{0.5}} \right)^2 + \left( \frac{\cos(x \ln(2n))}{(2n)^{0.5}} \right)^2 \right] = 0 \quad (5)\]

\[\sum_{n=1}^{\infty} \left[ (\frac{\sin(x \ln(2n))}{(2n)^{c}})^2 + (\frac{\cos(x \ln(2n))}{(2n)^{c}})^2 \right] \quad (6)\]

when \(\text{abs}(1) + \text{abs}(2) = 0\), \(x\) are non-trivial zero values. \(\quad (7)\)

I disproved Riemann hypothesis.
Especially I used (5) (6).

When \(c\) has a positive value, as the imaginary value increases to the limit, the existence of nontrivial zeros occupies various part of the positive region.
In contrast, it can be said that exactly the same imaginary number is negative. That is, in the case of the negative, in contrast to the c-line, in mirror image, the existence of non-trivial zero points can be said exactly the same.

When the imaginary value is small, all nontrivial zeros exist on c = 0.5.

**Introduction**

(1)\[= \cos[x*\ln1]/1^a – \cos[x*\ln2]/2^a + \cos[x*\ln3]/3^a – \cos[x*\ln4]/4^a + \cos[x*\ln5]/5^a.............\]

(2)\[= \sin[x*\ln1]/1^a – \sin[x*\ln2]/2^a + \sin[x*\ln3]/3^a – \sin[x*\ln4]/4^a + \sin[x*\ln5]/5^a.............\]

(1) is\[\sum_{n=1}^{\infty} \{\cos[x*\ln(2n-1)]/(2n-1)^{0.5} - \cos[x*\ln(2n)]/(2n)^{0.5} \} = 0\]

(2) is\[\sum_{n=1}^{\infty} \{\sin[x*\ln(2n-1)]/(2n-1)^{0.5} – \sin[x*\ln(2n)]/(2n)^{0.5} \} = 0\]

x are non-trivial zero values.

As a result of very many inspections, (1) ~ (6) confirmed that it was correct. However, it is not clear yet which of (1) (2) represents a real value and which represents an imaginary value.

A non-trivial zero is taken when both real and imaginary numbers are zero. It is in examples that we confirmed that these expressions are correct.

**Discussion**

It appears to be calculating even values, but this spans all real values, such as 14.1347 etc., and including infinity.

(Although both x and n are represented by real numbers so as to be easy to calculate, they are really imaginary numbers.)

\[= [\sin(x*\ln(2n))/(2n)^{c}]^2 + [\cos(x*\ln(2n))/(2n)^{c}]^2\]
\[
\left( \frac{\sin(x \log(2n))}{(2n)^c} \right)^2 + \left( \frac{\cos(x \log(2n))}{(2n)^c} \right)^2 = 0 \quad \text{……from (5)}
\]
\[
=2^{(-2c)} n^{(-2c)} \left( \sin^2(x \log(2n)) + \cos^2(x \log(2n)) \right) = 0
\]
\[
\sin^2(x \log(2n)) + \cos^2(x \log(2n)) = 1
\]

when \(c = -0.1\)
\[\{2^{(-2c)} n^{(-2c)}\}, \{c = -0.1\} = 1.1487n^{0.2}\]
if \(n=1000000\), \(1.1487n^{0.2} = 18.2057\ldots\)
When \(c = -0.1\), the values diverge and do not converge to zero.
When \(c <0\), the values diverge and do not converge to zero.

when \(c = -0.0001\)
\[\{2^{(-2c)} n^{(-2c)}\}, \{c = -0.0001\} = 1/(2n)^{(-0.0001)} = 1.00007n^{0.0001}\]
if \(n=1000000\), \(1/(2n)^{(-0.0001)} = 1.001451918788799\)
if \(n=10000000000000000000\), \(1/(2n)^{(-0.0001)} = 1.00445\ldots + 0.00031555856\ldots i\)
When \(c = -0.0001\), the values diverge and do not converge to zero.
When \(c <0\), the values diverge and do not converge to zero.

when \(c = 0\)
\[\{2^{(-2c)} n^{(-2c)}\}, \{c = 0\} = 1/(2n)^{(0)} = 1\]
When \(c = 0\), the value is one and do not converge to zero.

when \(c=0.0001\)
\[\{2^{(-2c)} n^{(-2c)}\}, \{c = 0.0001\} = 0.999861/n^{0.0002}\]
if \(n=1000000\), \(0.999861/n^{0.0002} = 0.997102\)
if \(n=10000000000\), \(0.999861/n^{0.0002} = 0.995267\)
if \(n=10000000000000000000\), \(0.999861/n^{0.0002} = 0.991151\)
Also at this time, the value converges to 0.
This is also true for \(n\) in the negative direction toward infinity.
if \(n = -10000000000\), \(0.999861/n^{0.0002} = 0.995267 - 0.000625345\ldots i\)
if \(n = -10000000000000000000\), \(0.999861/n^{0.0002} = 0.993435 - 0.000624194\ldots i\)
if \(n = -10000000000000000000\), \(0.999861/n^{0.0002} = 0.99115 - 0.000622758\ldots i\)
when c=0.01
\{ 2^{(-2c)}*n^{(-2c)} \}, \{c = 0.01\} = 0.986233/n^{0.02}
if n=1000000, 0.986233/n^{0.02}=0.748134...
if n=10000000000, 0.986233/n^{0.02}=0.622271...
if n=10000000000000000000, 0.986233/n^{0.02}=0.411130...
Also at this time, the value converges to 0.
This is also true for n in the negative direction toward infinity.
if n= -10000000000, 0.986233/n^{0.02}=0.621043... - 0.0390727... i
if n= -10000000000000, 0.986233/n^{0.02}=0.516561... - 0.0324993... i
if n= -10000000000000000000, 0.986233/n^{0.02}=0.410319... - 0.0258151... i

when c=0.2
\{ 2^{(-2c)}*n^{(-2c)} \}, \{c = 0.4\} = 0.574349/n^{0.8}
Also at this time, the value converges to 0.
This is also true for n in the negative direction toward infinity.

when c=0.4
\{ 2^{(-2c)}*n^{(-2c)} \}, \{c = 0.4\} = 0.574349/n^{0.8}
Also at this time, the value converges to 0.
This is also true for n in the negative direction toward infinity.

when c=0.5
\{ 2^{(-2c)}*n^{(-2c)} \}, \{c = 0.5\} = 0.5/n^{1}
if n=1000000, 0.5/n^{1}=0.0000005
When c = 0.5, the value is converge to zero.
This is also true for n in the negative direction toward infinity.

when c=0.6
\{ 2^{(-2c)}*n^{(-2c)} \}, \{c = 0.6\} = 0.435275/n^{1.2}
Also at this time, the value converges to 0.
This is also true for n in the negative direction toward infinity.

when c=0.7
\{ 2^{(-2c)}*n^{(-2c)} \}, \{c = 0.7\} = 0.378929/n^{1.4}
Also at this time, the value converges to 0.
This is also true for n in the negative direction toward infinity.

when c=1
\{2^{-(2c)}n^{-2c}\}, \{c = 1\} = 1/(4n^2)
Also at this time, the value converges to 0.
This is also true for n in the negative direction toward infinity.

when c=2
\{2^{-(2c)}n^{-2c}\}, \{c = 2\} = 1/(16n^4)
At this time, the value converges to 0.
This is also true for n in the negative direction toward infinity.

when c=3
\{2^{-(2c)}n^{-2c}\}, \{c = 3\} = 1/(64n^6)
At this time, the value converges to 0.
This is also true for n in the negative direction toward infinity.

Etc.

n grows to infinity.
Therefore, it becomes 0.
That is, when it becomes infinite,
It is likely that there are not necessarily nontrivial zeros on c = 0.5.
c = 0.0001, c = 0.01, c = 0.4, c = 0.6, c = 0.7, c = 0.8, c = 2, c = 3 etc. converges to 0.
That is, when c is a value larger than 0, that is, when c is a positive value, the value converges to 0.

That is, when c has a positive value, as the imaginary value increases to the limit, the existence of nontrivial zeros occupies various part of the positive region.

In contrast, it can be said that exactly the same n is negative.

That is, in the case of the negative, in contrast to the c-
line, in mirror image, the existence of non-trivial zero points can be said.

When the imaginary value is small, all nontrivial zeros exist on $c = 0.5$.

**examples**

These are only a few of what I checked.

$\left\{ \frac{\sin(x\log(2n-1))}{\sqrt{2n-1}} - \frac{\sin(x\log(2n))}{\sqrt{2n}}, x = n = 14.134725142 \right\}$

$\approx 0.095066538$

$\left\{ \frac{\sin(x\log(2n-1))}{\sqrt{2n-1}} - \frac{\sin(x\log(2n))}{\sqrt{2n}}, x = n = 21.02239639 \right\}$

$\left\{ \frac{\cos(x\log(2n-1))}{\sqrt{2n-1}} - \frac{\cos(x\log(2n))}{\sqrt{2n}}, x = n = 14.134725142 \right\}$

$\approx 0.0103708317$

$\left\{ \frac{\sin(x\log(2n-1))}{\sqrt{2n-1}} - \frac{\sin(x\log(2n))}{\sqrt{2n}}, x = n = 21.02239639 \right\}$
\[
\approx 0.0765492 \\
\frac{\cos(x \log(2n-1))}{\sqrt{2n-1}} - \frac{\cos(x \log(2n))}{\sqrt{2n}}, \ x = n = 21.02239639 \\
\approx 0.0133284 \\
\frac{\sin(x \log(2n-1))}{\sqrt{2n-1}} - \frac{\sin(x \log(2n))}{\sqrt{2n}}, \ x = n = 25.01085758 \\
\approx 0.0691312 \\
\frac{\cos(x \log(2n-1))}{\sqrt{2n-1}} - \frac{\cos(x \log(2n))}{\sqrt{2n}}, \ x = n = 25.01085758 \\
\approx -0.0163009 \\
\frac{\sin(x \log(2n-1))}{\sqrt{2n-1}} - \frac{\sin(x \log(2n))}{\sqrt{2n}}, \ x = n = 30.424876126 \\
\approx -0.039825193 \\
\frac{\cos(x \log(2n-1))}{\sqrt{2n-1}} - \frac{\cos(x \log(2n))}{\sqrt{2n}}, \ x = n = 30.424876126 \\
\approx -0.050382705 \\
\frac{\sin(x \log(2n-1))}{\sqrt{2n-1}} - \frac{\sin(x \log(2n))}{\sqrt{2n}}, \ x = n = 32.935061588 \\
\approx -0.052717905
\[
\begin{align*}
\{ \cos(x \ln(2n)) - \cos(x \ln(2n-1)) \}/(2n)^{0.5} & \approx 0.031994214 \\
\{ \sin(x \ln(2n)) - \sin(x \ln(2n-1)) \}/(2n)^{0.5} & \approx -0.018868111 \\
\{ \cos(x \ln(2n)) - \cos(x \ln(2n-1)) \}/(2n)^{0.5} & \approx -0.054467213 \\
\{ \sin(x \ln(2n)) - \sin(x \ln(2n-1)) \}/(2n)^{0.5} & \approx -0.044108644 \\
\sum_{n=1}^{10000} \{ \cos[14.1347 \ln(2n)]/(2n)^{0.5} - \cos[14.1347 \ln(2n-1)]/(2n-1)^{0.5} \} & \approx 0.000638101115460895086174021197592243465036 \\
\end{align*}
\]

(1)+(2).
\[
\sqrt{2} \sin\left(\frac{\pi}{4} + x\right)
\]

\[\cos(x) + \sin(x) = \sqrt{2} \sin\left(\frac{\pi}{4} + x\right)\]
(1)+(2) can be replaced as (3).
replace infty to 100 and x to 14.1347.

\[
\sum_{n=1}^{100} \sqrt{2} \left( \frac{\sin\left(\frac{\pi}{4} + 14.1347 \log(2n-1)\right)}{\sqrt{2n-1}} - \frac{\sin\left(\frac{\pi}{4} + 14.1347 \log(2n)\right)}{\sqrt{2n}} \right) \approx -0.01532651741996052028737568405149319529502
\]

This is considered to converge to 0.

\[
\sum_{n=1}^{10000} \sqrt{2} \left( \frac{\sin\left(\frac{\pi}{4} + 14.1347 \log(2n-1)\right)}{\sqrt{2n-1}} - \frac{\sin\left(\frac{\pi}{4} + 14.1347 \log(2n)\right)}{\sqrt{2n}} \right) \approx -0.002791552788530283768949767561819613081816
\]

(1)- (2).

\[
\sqrt{2} \sin\left(\frac{\pi}{4} - x\right)
\]

\[
\cos(x) - \sin(x) = \sqrt{2} \sin\left(\frac{\pi}{4} - x\right)
\]

(1)- (2) can be replaced as (4).
replace infty to 100 and x to 14.1347.

\[
\sum_{n=1}^{100} \sqrt{2} \left( \frac{\sin\left(\frac{\pi}{4} - 14.1347 \log(2n-1)\right)}{\sqrt{2n-1}} - \frac{\sin\left(\frac{\pi}{4} - 14.1347 \log(2n)\right)}{\sqrt{2n}} \right) \approx -0.04759578965334852442320301721122297973935
\]
(1) + (2) could be calculated up to 10000, but (1)-(2) could not be calculated up to 10000 and was kept at 8000.

\( \sum_{n=1}^{8000} \sqrt{2} \left( \frac{\sin\left(\frac{\pi}{4} - 14.1347 \log(2n - 1)\right)}{\sqrt{2n - 1}} - \frac{\sin\left(\frac{\pi}{4} - 14.1347 \log(2n)\right)}{\sqrt{2n}} \right) \approx -0.004614409314652976458875981126334544530503 \)

This is considered to converge to 0.

and, \( \sum_{n=1}^{\infty} \sqrt{2} \left( \frac{\sin\left(\frac{\pi}{4} - 14.1347 \log(2n - 1)\right)}{\sqrt{2n - 1}} - \frac{\sin\left(\frac{\pi}{4} + x \ln(2n - 1)\right)}{\sqrt{2n - 1}} \right) \)

Replace infty to 1000 and x to 14.1347

\( \sum_{n=1}^{1000} \sqrt{2} \left( \frac{\sin\left(\frac{\pi}{4} + 14.1347 \ln(2n - 1)\right)}{\sqrt{2n - 1}^{0.5}} - \frac{\sin\left(\frac{\pi}{4} + x \ln(2n)\right)}{\sqrt{2n}^{0.5}} \right) \approx -0.01556436944876230736137524457788190696657 \)

This is considered to converge to 0.

and, Replace 0.5 with 0.49

\( \sum_{n=1}^{1000} \sqrt{2} \left( \frac{\sin\left(\frac{\pi}{4} + 14.1347 \ln(2n - 1)\right)}{(2n - 1)^{0.49}} - \frac{\sin\left(\frac{\pi}{4} + x \ln(2n)\right)}{(2n)^{0.49}} \right) \)

\( \sum_{n=1}^{1000} \sqrt{2} \left( \frac{\sin\left(\frac{\pi}{4} + 14.1347 \log(2n - 1)\right)}{(2n - 1)^{0.49}} - \frac{\sin\left(\frac{\pi}{4} + 14.1347 \log(2n)\right)}{(2n)^{0.49}} \right) \approx -0.03689196501413002088421862729934230927774 \)
This is not considered to converge to zero.

and,

Replace 0.49 with 0.51

\[
\sum_{n=1}^{1000} \sqrt{2} \left( \frac{\sin\left(\frac{\pi}{4} + 14.1347 \log(2n-1)\right)}{(2n-1)^{0.51}} - \frac{\sin\left(\frac{\pi}{4} + 14.1347 \log(2n)\right)}{(2n)^{0.51}} \right) \geq 0.005355342793111209390547640768881658020116
\]

This is not considered to converge to zero.

and,

\[
\sum_{n=1}^{5000} \sqrt{2} \left( \frac{\sin\left(\frac{\pi}{4} + 14.1347 \log(2n-1)\right)}{(2n-1)^{0.51}} - \frac{\sin\left(\frac{\pi}{4} + 14.1347 \log(2n)\right)}{(2n)^{0.51}} \right) \geq 0.02516064010777708763118601328319433647897
\]

and,

\[
\sum_{n=1}^{8000} \sqrt{2} \left( \frac{\sin\left(\frac{\pi}{4} + 14.1347 \log(2n-1)\right)}{(2n-1)^{0.51}} - \frac{\sin\left(\frac{\pi}{4} + 14.1347 \log(2n)\right)}{(2n)^{0.51}} \right) \geq 0.02516064010777708763118601328319433647897
\]
If 0.5, it is calculated to 10000, but at 0.51, 8000 or 5000 seems to be the limit.

and, when \( 14.1347 - 0.1 = 14.0347 \)

\[
\sum_{n=1}^{1000} \sqrt{2} \left( \frac{\sin \left( \frac{\pi}{4} + 14.1347 \log(2n) \right)}{(2n - 1)^{0.51}} - \frac{\sin \left( \frac{\pi}{4} + 14.1347 \log(2n) \right)}{(2n)^{0.51}} \right) 
\]

\[
0.02275125952667805200340963680197978335665 
\]

This is not considered to converge to zero.

when \( 14.1347 + 0.1 = 14.2347 \)

\[
\sum_{n=1}^{1000} \sqrt{2} \left( \frac{\sin \left( \frac{\pi}{4} + 14.0347 \log(2n) \right)}{\sqrt{2n - 1}} - \frac{\sin \left( \frac{\pi}{4} + 14.0347 \log(2n) \right)}{\sqrt{2n}} \right) 
\]

\[
0.1819954913221298943899378921269795775727 
\]

This is not considered to converge to zero.
when
\[ \sum_{n=1}^{\infty} \left\{ \sqrt{2} \cdot \sin \left[ \frac{\pi}{4} + x \cdot \ln(2n) \right] / (2n) \right\} = 0 \]

\[ \sum_{n=1}^{1000} \left( \frac{\cos(14.1347 \log(2n - 1))}{\sqrt{2(n - 1)}} - \frac{\cos(14.1347 \log(2n))}{\sqrt{2n}} \right) \approx -0.009063013671335821519956190406232181070163 \]

etc.

References
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I am a psychiatrist now and also a doctor of brain surgery before.
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