The curse of Riemann.
Proof of the Riemann hypothesis

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Abstract

Up to now, I have tried to expand this equation and prove Riemann hypothesis with the equation of cos, sin, but the proof was impossible.

However, I realized that a simple formula before expansion can prove it.

The real value is zero only when the real part of s is 1/2. Non-trivial zeros must always have a real value of zero.

key words

Riemann hypothesis, non-trivial zeros, critical line, 1/2

1 introduction

This is clear from $\zeta(s) = \frac{2^s}{2^s-2}\eta(s)$, that $\zeta(s) = \zeta(1-s)$ and $\eta(s) = \eta(1-s)$ have the same significance.

Both equations are valid only for non-trivial zeros.

In the case of $\eta(s)$, the proof of Riemann hypothesis is completed if it is proved that the value of the non-trivial zeros is taken only when the real part is 1/2.

Define $\quad 0 < \Re(s) < 1$

$$\eta(s) = \frac{2^s-2}{2^s}\zeta(s) = \zeta(s) - \frac{2}{2^s}\zeta(s) \tag{1}$$

$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{0.2+i14.1347}} = -0.7106998802... - 0.0393256547631...i$

$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{0.4+i14.1347}} = -0.20168483321... - 0.000398657711...i$

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$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{0.49+i14.1347}} = -0.01791363... - 0.004282038...i$
$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{1/2+i14.1347}} = 0.0009413486... - 0.0049571556...i$
$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{1/2-i14.1347}} = 0.0009413486... + 0.0049571556...i$
$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{0.6+i14.1347}} = 0.17375337127... - 0.01283865007...i$

$\{\frac{2^s}{2^s-2}\}, \{s = 1/2 + i14.1347\} = 0.411258... + 0.0913854...i$
$\{\frac{2^s}{2^s-2}\}, \{s = 1/2 - i14.1347\} = 0.411258... - 0.0913854...i$
$\{\frac{2^s-2}{2^s}\}, \{s = 1/2 + i14.1347\} = 2.31715... - 0.514893...i$
$\{\frac{2^s-2}{2^s}\}, \{s = 1/2 - i14.1347\} = 2.31715... + 0.514893...i$

$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{0.4+i21.022}} = -0.23505068... - 0.12926123561...i$
$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{1/2+i21.022}} = -0.00196549... - 0.00466251514...i$
$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{1/2-i21.022}} = -0.00196549... + 0.00466251514...i$
$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{0.6+i21.022}} = 0.18930834... + 0.08779032048...i$

$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{0.4+i25.01086}} = -0.195508869... + 0.152868555478...i$
$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{0.4-i25.01086}} = -0.195508869... - 0.152868555478...i$
$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{1/2+i25.01086}} = 0.002605178... - 0.0042652041...i$
$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{1/2-i25.01086}} = 0.002605178... + 0.0042652041...i$
$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{0.6+i25.01086}} = 0.1667076253... - 0.124423449...i$
$\sum_{n=1}^{10000} \frac{(-1)^{n-1}}{n^{0.6-i25.01086}} = 0.1667076253... + 0.124423449...i$

$\{\frac{2^s-2}{2^s}\zeta(s)\}, \{s = 0.4 + i25.01086\} = -0.202044... + 0.163593...i$
$\{\frac{2^s-2}{2^s}\zeta(s)\}, \{s = 1/2 + i25.01086\} = 3.42656... \times 10^{-6} + 4.41859... \times 10^{-6}i$
$\{\frac{2^s-2}{2^s}\zeta(s)\}, \{s = 1/2 - i25.01086\} = 3.42656... \times 10^{-6} - 4.41859... \times 10^{-6}i$
$\{\frac{2^s-2}{2^s}\zeta(s)\}, \{s = 0.6 + i25.01086\} = 0.165672... - 0.122724...i$
$\{\frac{2^s-2}{2^s}\zeta(s)\}, \{s = 0.6 - i25.01086\} = 0.165672... + 0.122724...i$

In $\eta(s)$, even if the plus or minus of the imaginary value of s is switched, the real value shows the same value, but the plus or minus of the imaginary value is different.
If s is a non-trivial zeros, both real and imaginary values converge to zero.

2 Discussion

from Eq.(1)

$$\zeta(s) = \eta(s) + \frac{2}{2^s}\zeta(s) \tag{2}$$

and

$$\zeta(1-s) = \eta(1-s) + \frac{2}{2^{1-s}}\zeta(1-s) \tag{3}$$

from $\zeta(s) = \zeta(1-s)$

$$[\eta(s) + \frac{2}{2^s}\zeta(s)] - [\eta(1-s) + \frac{2}{2^{1-s}}\zeta(1-s)] = 0 \tag{4}$$

$$[\eta(s) - \eta(1-s)] + [\frac{2}{2^s}\zeta(s) - \frac{2}{2^{1-s}}\zeta(1-s)] = 0 \tag{5}$$

$$[\eta(s) - \eta(1-s)] + [2^{1-s}\zeta(s) - 2^s\zeta(1-s)] = 0 \tag{6}$$

As can be seen from Eq.(6), it becomes 0 when s=1/2 is inserted.
That is, it is not 0 except for s=1/2.
This can be said to be the end of proof.

from Eq.(4)
$\{[\eta(s) + \frac{2}{2^s}\zeta(s)] - [\eta(1-s) + \frac{2}{2^{1-s}}\zeta(1-s)]\}, \{s = 0.4 + i16.1347\} = -0.493359... + 3.65957...i$
$\{[\eta(s) + \frac{2}{2^s}\zeta(s)] - [\eta(1-s) + \frac{2}{2^{1-s}}\zeta(1-s)]\}, \{s = 0.4 - i16.1347\} = -0.493359... - 3.65957...i$
$\{[\eta(s) + \frac{2}{2^s}\zeta(s)] - [\eta(1-s) + \frac{2}{2^{1-s}}\zeta(1-s)]\}, \{s = 1/2 + i14.1347\} = 0.000055107...i$
$\{[\eta(s) + \frac{2}{2^s}\zeta(s)] - [\eta(1-s) + \frac{2}{2^{1-s}}\zeta(1-s)]\}, \{s = 1/2 + i16.1347\} = 3.64713...i$
$\{[\eta(s) + \frac{2}{2^s}\zeta(s)] - [\eta(1-s) + \frac{2}{2^{1-s}}\zeta(1-s)]\}, \{s = 0.6 + i16.1347\} = 0.493359 + 3.65957...i$
$\{[\eta(s) + \frac{2}{2^s}\zeta(s)] - [\eta(1-s) + \frac{2}{2^{1-s}}\zeta(1-s)]\}, \{s = 0.6 - i16.1347\} = 0.493359... - 3.65957...i$
$\{[\eta(s) + \frac{2}{2^s}\zeta(s)] - [\eta(1-s) + \frac{2}{2^{1-s}}\zeta(1-s)]\}, \{s = 1/2 + i17.1347\} = 5.39992...i$
$\{[\eta(s) + \frac{2}{2^s}\zeta(s)] - [\eta(1-s) + \frac{2}{2^{1-s}}\zeta(1-s)]\}, \{s = 1/2 + i21.022\} = 0.000077614...i$
$\{[\eta(s) + \frac{2}{2^s}\zeta(s)] - [\eta(1-s) + \frac{2}{2^{1-s}}\zeta(1-s)]\}, \{s = 1/2 + i22.022\} = -2.61712...i$

As in these examples, when the real part is 1/2, the real value is 0, but the imaginary value remains.
When the real value of s is 1/2, the real value is completely 0, but even if the imaginary value is i14.1347, it is not removed because it contains an error.

$\zeta(0.4 + i16) = 0.921882... + 1.32365...i$
$\zeta(0.4 - i16) = 0.921882... - 1.32365...i$
$\zeta(1/2 + i14.1347) = 3.13536... \times 10^{-6} - 0.0000196934...i$
$\zeta(1/2 - i14.1347) = 3.13536... \times 10^{-6} + 0.0000196934...i$
$\zeta(1/2 + i15) = 0.147109907... + 0.7047522416...i$
$\zeta(1/2 - i15) = 0.147109907... - 0.7047522416...i$
$\zeta(1/2 + i16) = 0.938545408... + 1.216587815999...i$
$\zeta(1/2 - i16) = 0.938545408... - 1.216587815999...i$
$\zeta(0.6 + i16) = 0.952627... + 1.11841...i$
$\zeta(0.6 - i16) = 0.952627... - 1.11841...i$

In $\zeta(s)$ and $\eta(s)$, even if the imaginary value of s is changed, the real value shows the same value, but the imaginary value is different between plus and minus.

If the real part of s is 0.4, the real part of s is 0.6 from $\zeta(s) = \zeta(1-s)$.
Then, the real part value and the imaginary part value also change.

Even if $\zeta(s) = \zeta(1-s)$ is used in addition to 1/2, the value of the real part is only 1/2.

s = 1/2 is the minimum requirement for $\zeta(s) = \zeta(1-s)$ and $\eta(s) = \eta(1-s)$.
That is, the minimum condition for the non-trivial zeros is that the real value is 1/2.

The real value is zero only when the real part of s is 1/2. Non-trivial zeros must always have a real value of zero.

$$\Re(s) = \frac{1}{2} \tag{7}$$

Proof complete.

3 Postscript

These calculations were performed with WolframAlpha.

References

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I was finally crazy because of the curse of Riemann.

Please raise the prize money to my little son and daughter who are still young.