To whom it may concern,

These are my personal notes that I'm sharing for clarity. Please accept my apology for the messiness and unorganized manner. I will put the highlights on the main page. These notes are a collection of counterexample claims. Many iterations have been provided, making the notes extensive. However, they are still useful, and I don't see any efficient reason to clarify them for everybody. Again, my apologies, but I believe the main information should be sufficient for everyone. These notes are for documentation, representing my thoughts on this matter, and I have no problem sharing them with you transparently.

Please let me know if you have any questions or need further information.

Thank you ,

RSLT

Wednesday, December 11, 2024

Version 15 Notes

THE_COUNTER_EXA
MPLE_VERSION 15..pc

Theorem 2. *Let $s \in \{z|\Re(s) > 0, s \neq 1\}$. Then for any $b \in \mathbb{N}$ the following identity holds.*

$$\zeta(s) = \sum_{n=1}^{b} \frac{1}{n^s} - \frac{b^{1-s}}{1-s} - s\int_b^{\infty} \frac{x - \lfloor x \rfloor}{x^{s+1}} dx.$$

Theorem 2 = abc zeta function new proof. It is correct (https://www.0bq.com/azf)

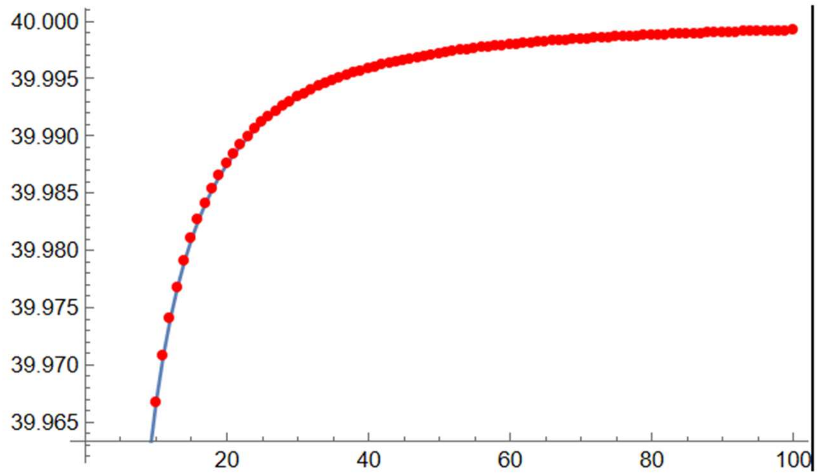
Theorem 3. *Let $x \in \mathbb{R}$ be arbitrary. Then the following identity holds.*

$$\lim_{k\to\infty} [\sum_{n=1}^{\lfloor (k+x)^2 \rfloor} \frac{1}{\sqrt{n}} - \sum_{n=1}^{k^2} \frac{1}{\sqrt{n}}] = 2x.$$

```
f[k_,x_]:=Sum[1/Sqrt[n],{n,1,(k+x)^2}]
g[k_]:=Sum[1/Sqrt[n],{n,1,k^2}]
kRange=Range[1,100];
```

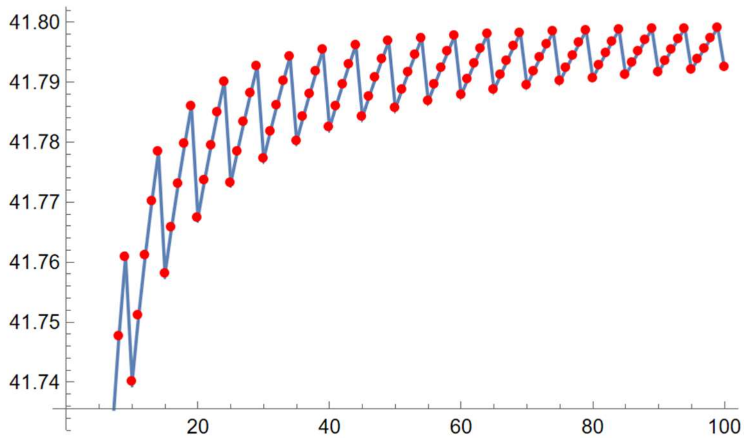
```
x=20;
ListLinePlot[Table[f[k,x]-g[k],{k,kRange}],Mesh->All,MeshStyle->Red]
```

Out[82]=




```
x = 20.9;
ListLinePlot[Table[f[k, x] - g[k], {k, kRange}], Mesh → All, MeshStyle → Red]
```

Out[25]=



$$2\lim_{k\to\infty}(\sqrt{(k+x)^2}-\sqrt{k^2}) = 2\lim_{k\to\infty}(k+x-k) = 2x.$$

Theorem 3 appears to be correct due to above proof where (k+x)^2=[(k+x)^2] . In overall it is correct.

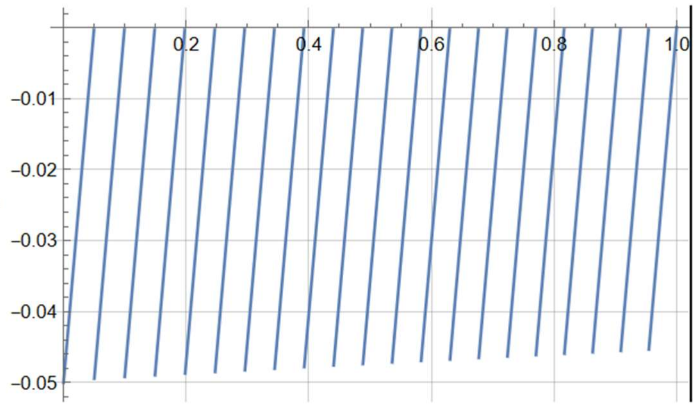
$$0 \le |\sqrt{\lfloor (k+x)^2\rfloor}-\sqrt{(k+x)^2}| = |\frac{\lfloor (k+x)^2\rfloor-(k+x)^2}{\sqrt{\lfloor (k+x)^2\rfloor}+\sqrt{(k+x)^2}}|$$

$$\le \frac{1}{\sqrt{\lfloor (k+x)^2\rfloor}+\sqrt{(k+x)^2}} \to 0, k\to\infty. \qquad (9)$$

9 is correct since (k+x)^2=[(k+x)^2] for arbitrary large k and finite x.

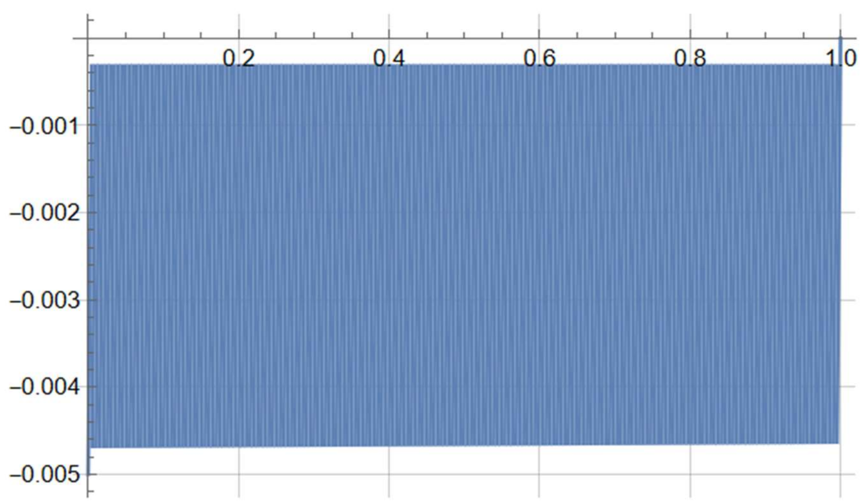
```
k=10;
f[x_]:=Abs[Sqrt[Floor[(k+x)^2]]-Sqrt[(k+x)^2]];
g[x_]:=1/ (Sqrt[Floor[(k+x)^2]]+Sqrt[(k+x)^2])
Plot[f[x]-g[x],{x,0,1},GridLines->Automatic]
```

Out[67]=



K=100

Out[86]=



$$2\lim_{k\to\infty}(\sqrt{(k+x)^2}-\sqrt{k^2}) = 2\lim_{k\to\infty}(k+x-k) = 2x. \tag{10}$$

After substituting (9) and (10) into (8) we obtain the theorem statement. □

But if we had the extension for limit definition, which respects the classical limit, by (4) and consequently (5) we would obtain that

$$\forall x \in \mathbb{R} 2x = \lim_{k\to\infty}[\sum_{n=1}^{\lfloor (k+x)^2 \rfloor}\frac{1}{\sqrt{n}} - \sum_{n=1}^{k^2}\frac{1}{\sqrt{n}}] = \zeta(\frac{1}{2}) - \zeta(\frac{1}{2}) = 0,$$

which is obviously a contradiction. Thus, there is no any limit definition, which makes this work. To make the justification complete we should prove that under the limit extension, which preserves analytic continuation, the limits $\lim_{k\to\infty}\sum_{n=1}^{k^2}\frac{1}{n^s}$ and $\lim_{k\to\infty}\sum_{n=1}^{\lfloor (k+x)^2 \rfloor}\frac{1}{n^s}$ generate the same function, despite what you have told me.

Note that (k+x) ^2=[(k+x)^2] for arbitrary large k and finite x.

In step 10, it is clearly stated that (k + x) = infinity, and we understand that infinity - infinity = 2x, so they are not equal. However, in the next line, it is forgotten, and it is claimed that $(k + x)^2 = k^2$ since limit k to infinity to upper bound of sums are infinity , thus making both sums equal. So basically, the contradiction lies in the assumption that (k + x) = k.

In other words, using $(k + x)^2 = [(k + x)]^2$ and the transcendental zeta function, which is an analytic continuation of these functions, we obtain:

Analytic Continuation of (Sum [n=1 to $(k + x)^2$ (n^-.5)])= Analytic Continuation of (sum[n=1 to k^2)(n^-.5)])= Sum [n=1 to $(k + x)^2$ (n^-.5)] - 2(k + x) = sum[n=1 to k^2)(n^-.5)] - 2k = zeta(1/2).

The problem is that the author knows that Sum [n=1 to $(k + x)^2$ (n^-.5)] - sum[n=1 to k^2)(n^-.5)] - 2x = 0, but decides to move 2x to the other side of the equality, thus making Sum [n=1 to $(k + x)^2$ (n^-.5)] - sum[n=1 to k^2)(n^-.5)] = 2x, somehow claiming it must be zero and since 2x is not zero it contradiction. The simple version will be: 2 - 2 = 3 - 3 = 0. Then, by moving -2 and -3 to the other side, we get 2 + 3 = 3 + 2. The author claims that 2 + 3 = 3 + 2 = 0 is a contradiction. Perhaps the author wanted to say $(k + x)^2 = k^2$, thus Sum [n=1 to $(k + x)^2$ (n^-.5)] = Sum [n=1 to $(k)^2$ (n^-.5)] = zeta(1/2), where ironically, the author proved that they are not equal and yet claim they are equal at the same time.

The error is the assumption that infinity equals infinity without any proof, when in this case, they are not equal. Which is very common (including **version 14**).

Remark 3. *Assume that there exists an extension of the limit definition, which preserves the analytic continuation to the critical strip. Then the following equality holds.*

$$\lim_{k\to\infty}\sum_{n=1}^{k^2}\frac{1}{n^s}=\lim_{k\to\infty}\sum_{n=1}^{\lfloor (k+x)^2\rfloor}\frac{1}{n^s}, \Re(s)\in(0,1), x\in\mathbb{R}$$

We can see the same error again. The irony is that Theorem 3 states these functions for s = 1/2 are not equal unless x = 0.

The wrong proof comes forms an incorrect application of the Identity theorem. See the abridged Riemann's last theorem for the correct application of IT in this context.

IT cannot be use when both function are divergence . More detail See 0bq.com

https://www.google.com/search?q=identaily+therom&rlz=1C1CHBF_enUS1023US1023&oq=identaily+th#fpr=r

Theorem 4. *Let $x\in\mathbb{R}$ be arbitrary. Then the following identity holds.*

$$\left[\sum_{n=1}^{\lfloor(\max\{2,-\lfloor x\rfloor+1\})^2\rfloor}\frac{1}{\sqrt{n}}-\sum_{n=1}^{(\max\{2,-\lfloor x\rfloor+1\})^2}\frac{1}{\sqrt{n}}\right]+\sum_{k=\max\{2,-\lfloor x\rfloor+1\}+1}^{\infty}\left[\sum_{n=\lfloor(k+x)^2\rfloor+1}^{\lfloor(k+1+x)^2\rfloor}\frac{1}{\sqrt{n}}-\sum_{n=k^2+1}^{(k+1)^2}\frac{1}{\sqrt{n}}\right]=2x.$$

Theorem 4 seems interesting, but it is neither related to nor used in the proof. It appears to be a more advanced version of Theorem 3.

3 Final Words

3.1 The problems with your subtraction method

For the end of the discussion I want to show, what actually happens, if we restrict ourselves to the permutation you've suggested. Let us use the Theorem 2 and by the similar to yours calculation check if your representation is defined on the critical strip at all. We obtain

$$\zeta(s) = \sum_{n=1}^{b} \frac{1}{n^s} - \frac{b^{1-s}}{1-s} + o(1), \tag{11}$$

$$\zeta(1-\bar{s}) = \sum_{n=1}^{b} \frac{1}{n^{1-\bar{s}}} - \frac{b^{\bar{s}}}{\bar{s}} + o(1). \tag{12}$$

After subtracting (12) from (11) we obtain the following after some obvious transformations of equations and passing to the limit.

$$\lim_{b\to\infty}[\sum_{n=1}^{b} \frac{1}{n^s} - \sum_{n=1}^{b} \frac{1}{n^{1-\bar{s}}}] = \zeta(s) - \zeta(1-\bar{s}) - \lim_{b\to\infty}[\frac{b^{1-s}}{1-s} - \frac{b^{\bar{s}}}{\bar{s}}]$$

$$\zeta(s) - \zeta(1-\bar{s}) - \lim_{b\to\infty} b^{\frac{1}{2}+i\Im(s)}[\frac{b^{\frac{1}{2}-\Re(s)}}{1-s} - \frac{b^{\Re(s)-\frac{1}{2}}}{\bar{s}}] \tag{13}$$

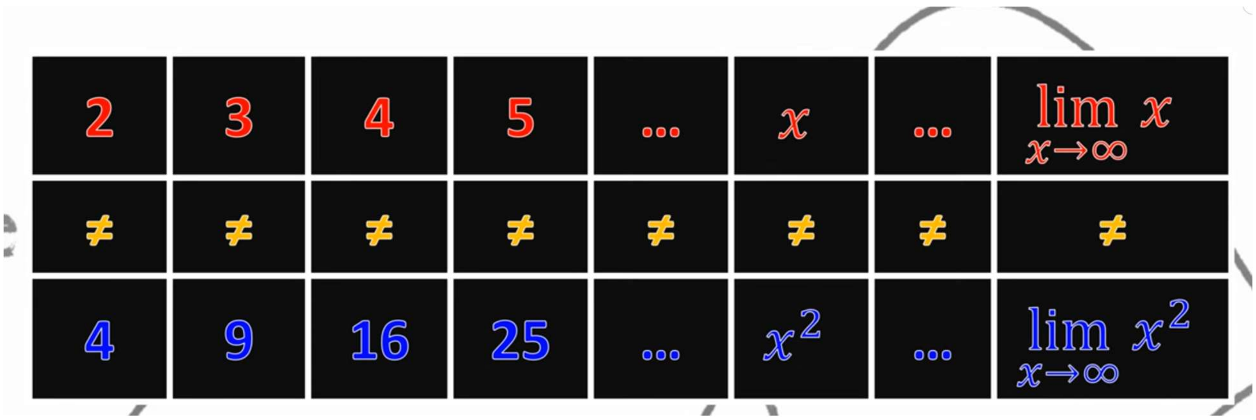
From (13) we can see that your difference is not defined anywhere but the critical strip at all. Indeed, if $\Re(s) > \frac{1}{2}$, then the term $\frac{b^{\Re(s)-\frac{1}{2}}}{\bar{s}}$ blows up to infinity, while $\frac{b^{\frac{1}{2}-\Re(s)}}{1-s}$ tends to zero. As the result, since the difference of those terms is infinite, the multiplication by the exponent, which also diverges to infinity, leaves this divergent. Analogously, if $\Re(s) < \frac{1}{2}$, the term $\frac{b^{\frac{1}{2}-\Re(s)}}{1-s}$ blows up to infinity, the term $\frac{b^{\Re(s)-\frac{1}{2}}}{\bar{s}}$ tends to zero and the similar problem occurs. As the line $\Re(s) = \frac{1}{2}$ is disjoint from the domain $\Re(s) > 1$, by the Remark 1 it has no relation to Riemann zeta-function and cannot be used for the studies of its properties.

This argument has nothing to do with the rest, and it's not clear why it's called 'final words'. There are a few incorrect and very misunderstood ideas. The main issue comes from a very misunderstood interpretation of the Identity theorem(as we saw earlier) . It seems the author has not understood yet why the zeros of the zeta function are related to the Riemann zeta function and Euler Product. He seems to believe that the analytic continuation of a function is not related to the original function. For example, in simplest term considering " no relation to Riemann Zeta-function ...)" it is claer the author believes that 1 + 2 + 3... has no relation to zeta (-1) = -1/12 because 1+2+3... is divergence. The confusion is frustrating because I know the author is aware of Riemann's last theorem equation 12, and this page https://www.0bq.com/66) and any claim like this simply not a good sign. I understand that a person might not know at first glance, but after version 14, missing this point is concerning.

It is nice to see an understanding of concepts like how, for real(s) = 1/2, the supersymmetric relation (https://www.0bq.com/se hold in simpler language. However, it seems there is still a long way to go in understanding that the abc zeta function provides a continuous path to all these values on the critical line. All terms of the abc zeta function for finite b are finite.

I have reviewed this document for numeric counterexample, and confirmed the author failed, to provide a numeric counterexample. Below are highlights, and you can see more details in note.

In general, the main challenge the author seems to face is not understanding how to properly handle infinity, when they are unequal, and when and why they are. The author claims that two infinite sums are equal, while at the same time proving that they are not equal when making this claim, contradicting himself and ignoring the fact that it was his mistake to obtain two different results. It is like a person take different to obtain a different answer for an integral, claiming the integral is false due to the contradiction. Note: The Identity theorem definitely doesn't provide any basis to claim that infinity equals infinity. Infinites are not equal by default as you can see below.



If we perform one mathematical operation and obtain a result, then do a different operation or equation and get a different result, it is not a contradiction, but generally a mistake. In other words, there is a fine line between contradiction and bad math. In this version, all errors are considered contradictions.

Additionally, the author continues to present arguments without providing numeric counterexamples, which would help clarify the discussion and prevent confusion. If the argument were valid in any form, we would expect it to generate a numeric counterexample.

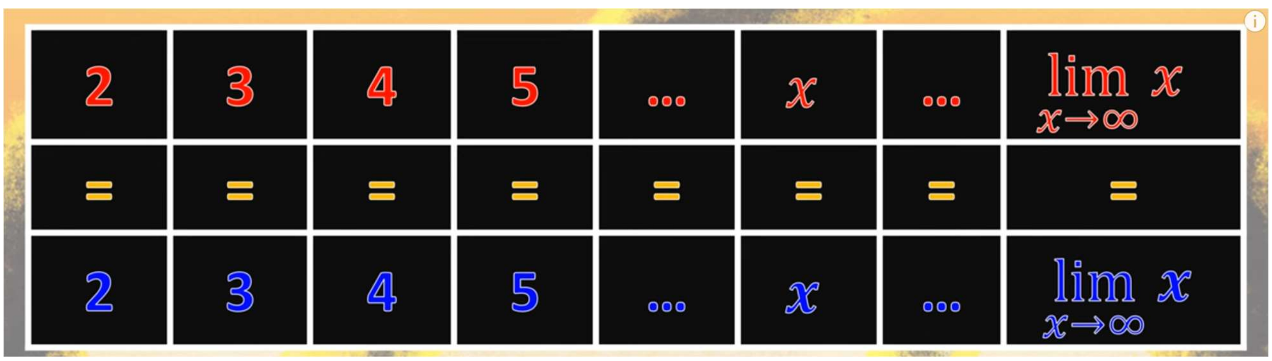
This is why math schools are so bad these days—they don't teach people how to deal with indeterminate forms because they fear students might figure out the entire real number system, limits, etc. It's a big misunderstanding.

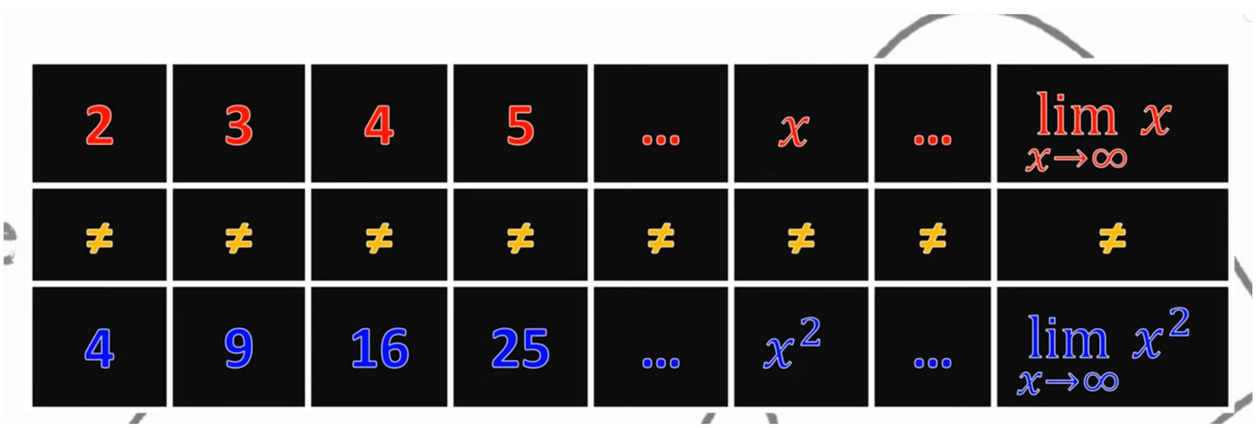
Version 14 Notes

Numerical Reasoning.pptx

https://www.youtube.com/watch?v=i4krIeB4dWs

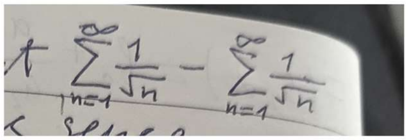
In Version 14, the argument contradicts Version 13 as opposite arguments. This video and slide start with debunking a proof unrelated to this Riemann's last theorem. Then, from the middle to the end of the video, it starts explaining one of the interesting features of Riemann's last theorem (SEE https://www.0bq.com/se) and ends with a method for debunking the SEE using arguments from the Abridged Riemann's last theorem article. The core idea of debunking is that the author (of the video and Version 14 slide .pdf) does not explicitly say but claims that Version 13 is wrong. So, if Version 13 is wrong, thus the opposite is wrong. In other words, saying that because 13 or 14 are opposite versions, if one is false, it means the other one is true, which is a false logic. For example, if the goal is to get to the North Pole and you tell someone who is going east that they are in the wrong direction, it doesn't mean the west direction is the correct answer. In this case, in version 13, the author claims that through some error, the author claims that two functions are equal by using the argument that ∞=∞ (east), then when referencing the video and argument, in version 14, the argument is ∞≠∞ and thus the SSE is wrong. Where you can see (below) that depending on the rate of growth of infinity, equality and non-equality are possible, and claiming that one of ∞≠∞ or ∞=∞ must be correct is false.



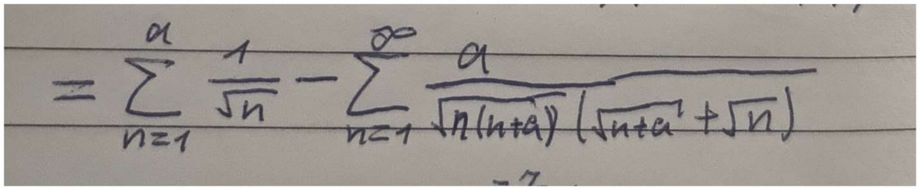


Also, the information below was partial and out of context when it was presented. The simple argument below was part of an email exchange (partially shown on the slide) revealing a fatal error in version 13 that I believe led to version 14.

Ok, let me try a different way.
Let below be f(n) where it is zero.We know that Limit X -limit X=0 X=1,2,….∞ 1-1 =0, ½^.5-1/2^.5=0 1/3^.5-1/3^.5=0….. (apple-apple is zero) .



You claim a function below g(n) =f(n)



and also calim also calim g(n)≠0

Because f(n)=0 and g(n)≠0, we conclude that g(n) ≠f(n).

At the end of the video, the author is complaining about a private discussion that the author chose to partially make public, as it appears. I'll limit my comment to stating that it is out of context and doesn't make his argument correct. I want to reiterate that if the goal is to stop arguing about trivial matters, whether it concerns others or myself, it is not productive.

So overall, this is yet another failed attempt to prove Riemann's Last Theorem, as the article has fallen short and not achieved the proof of the Riemann Hypothesis. I didn't go into detail as it is, and I would like you to see my answer on the other version that is more comprehensive. If there are any questions, please let me know, and I will be happy to respond. Note that the author falls short in proving a numeric counterexample after 14 attempts. Also, I must say that with the presented data in the video and slides, the author appears to be a very intelligent individual. However, in no shape or form does this prove the author can provide a numeric counterexample to the Riemann's Last Theorem. I do strongly agree with him that his best work yet to come.

code provided by the author.

```
from scipy.integrate import quad
import numpy as np

def eta(s, l):
  return sum((-1) ** k / k ** s for k in range(1, l*1000))

def isomorphism(s):
  return -1j * np.log(s) / (666 * np.pi) + 0.75


def integrand1(t1, t2, r, t, l):
  s = r * np.exp(1j * (t * (t2 - t1) + t1))
  eta_phi = 1 / eta(isomorphism(s), l)
  return eta_phi * s * (t2 - t1) * 1j


def loopintegralcheck(r1, r2, t1, t2, l):
  try:
    s1, er1 = quad(lambda t: (integrand1(t1, t2, r2, t, l).real - integrand1(t1, t2, r1, t, l).real), 0, 1)
    s2, er2 = quad(lambda t: (integrand1(t1, t2, r2, t, l).imag - integrand1(t1, t2, r1, t, l).imag), 0, 1)

    if abs(s1 + 1j * s2) >= 0.001:
      return True, s1 + 1j * s2
    else:
      return False, s1 + 1j * s2
  except ZeroDivisionError:
    return True, 1
```

```
# Initial values
r1 = 0.5
r2 = 1
t1 = -np.pi
t2 = np.pi
l = 1

while l <= 200:
   print("Step number:", l)
   while True:
      if loopintegralcheck(r1, r2, t1, t2, l)[0]:
         print("We've found the desired lower bound!, r1=", r1)
         print("The value of the integral:", loopintegralcheck(r1, r2, t1, t2, l)[1])
         T1 = isomorphism(r1).imag
         T2 = isomorphism(2 * r1).imag
         print("The upper bound for the imaginary part =", T1)
         print("The lower bound for the imaginary part =", T2)

         break
      r1 /= 2
      print(r1)
   l+=1


   r1 = 0.5
```

Version 13 Notes

THE_COUNTER_EXAMPLE_TO_SUPER_SYMMETRY_EQUATION (13).pdf

Lemma 1. *This result is given here:* `https://www.0bq.com/azf`

$$\zeta(s) = \sum_{n=1}^{N} \frac{1}{n^s} - \frac{N^{1-s}}{1-s} - s\int_N^\infty \frac{x - \lfloor x \rfloor}{x^{s+1}}.$$

As the integral vanishes after taking the limit $N \to \infty$, we shall further use the notation $o(1)$ for this integral and obtain the following representation, which is the notation of the term, which is convergent to zero.

$$\zeta(s) = \sum_{n=1}^{N} \frac{1}{n^s} - \frac{N^{1-s}}{1-s} + o(1).$$

Uses little-o notation incorrectly and probably meant to refer to O_1, but that doesn't make a difference in context since this value is meant to be zero. For that reason, it can be considered a pass.

Lemma 2.

$$\sum_{n=1}^{\infty} \frac{1}{n^s} = \lim_{k\to\infty} \sum_{n=1}^{k} \frac{1}{n^s} = \lim_{k\to\infty} \sum_{n=1}^{m(k)} \frac{1}{n^s}, \Re(s) \in (0,1).$$

where $\{m(k)|k \geq 1\}$ *is any other subsequence of the sequence of the positive integers.*

Proof. We know that it holds for the series (1) in the domain $Re(s) > 1$ as this series is absolutely convergent on the corresponding domain. Therefore, by the uniqueness theorem, as the domain $Re(s) > 1$ consists of the accumulation points, if the series (1) can be defined on the domain $\Re(s) \in (0,1)$, those limits should be equal on this domain to the same sum, like it is done before in the corresponding article `https://www.0bq.com/arslt` while performing the step from (8) to (9). □

Interesting approach. Probably meant to use the Identity Theorem. However, the Identity Theorem and the uniqueness and analytic continuation are closely related. Also, probably meant to refer to a different equation Abridged Riemann's Last Theorem Article. The Lemma 2 can be considered correct; however, it's on the borderline of mistake. For that reason, it is a pass for the sake of argument.

Lemma 3. *Let s be a non-trivial zero of Riemann zeta-function. Then SSE* $\Longrightarrow \Re(s) = \frac{1}{2}$.

Proof. The proof may be found by the link `https://www.0bq.com/arslt`, the result corresponds to the equation (15). □

This is Contrapositive of the of rewind Poof of Abridged Riemann's Last Theorem Article and that is correct.

Lemma 4. *Let s be a non-trivial zero of Riemann zeta-function. Then SSE $\Longrightarrow \Re(s) = \frac{1}{3}$.*

By the Lemma 1 we obtain the following.

$$\zeta(s) = \sum_{n=1}^{8k^3} \tfrac{1}{n^s} - \tfrac{(8k^3)^{1-s}}{1-s} + o(1), \tag{2}$$

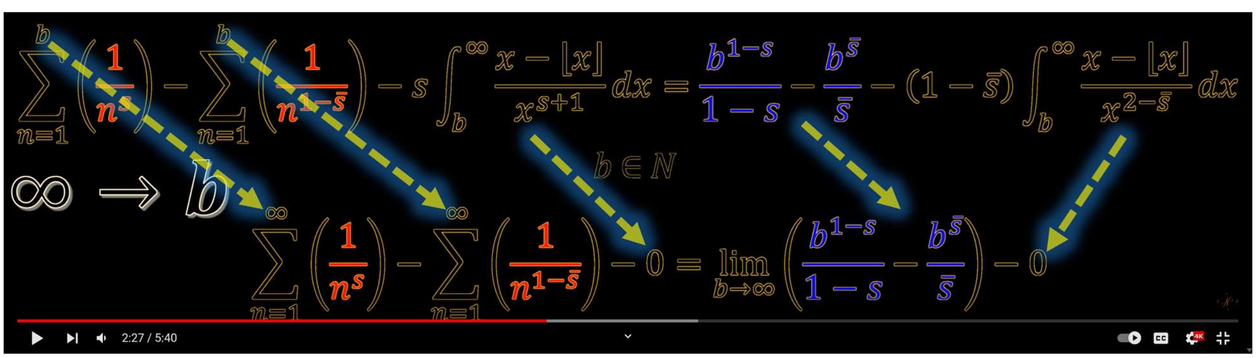
$$\zeta(1-\bar{s}) = \sum_{n=1}^{8k^6} \tfrac{1}{n^{(1-\bar{s})}} - \tfrac{(8k^6)^{\bar{s}}}{\bar{s}} + o(1). \tag{3}$$

We note that $\{8k^3|k \geq 1\}$ and $\{8k^6|k \geq 1\}$ are the subsequences of the sequence of positive integers such that $\lim_{k\to\infty} 8k^3 = \lim_{k\to\infty} 8k^6 = \infty$. Therefore, we are able to use Lemma 2. Subtract (3) from (2) and obtain the following with respect to Lemma 2 after taking the limit as $k \to \infty$.

$$\zeta(s) - \zeta(1-\bar{s}) = \sum_{n=1}^{\infty} \tfrac{1}{n^s} - \sum_{n=1}^{\infty} \tfrac{1}{n^{(1-\bar{s})}} + \lim_{k\to\infty} (\tfrac{(8k^6)^{\bar{s}}}{\bar{s}} - \tfrac{(8k^3)^{1-s}}{1-s}). \tag{4}$$

Lemm4 is false. It appears that the rest of the paper attempts to justify this assumption theorem. I listed a few and also mentioned the fatal reasons.

Regarding (2) and (3) as mentioned for Lemma 1, using little-o notation incorrectly in this ARSLT article. The O_1notation is meant to be a placeholder for the Omition sub 1. For O_2, it must be used for (3); it's meant to be O_1 *and* O_2 , they are not necessarily equal beyond the critical line or for any finite b(N). However, it is appers meant to say that these values are zero, which is consistent with the ARSLT article as depicted below. This is wrong; however, it's not a fatal error and can be corrected using O_1 *and* O_2.



We note that $\{8k^3|k \geq 1\}$ and $\{8k^6|k \geq 1\}$ are the subsequences of the sequence of positive integers such that $\lim_{k\to\infty} 8k^3 = \lim_{k\to\infty} 8k^6 = \infty$. Therefore, we are able to use Lemma 2. Subtract (3) from (2) and obtain the following with respect to Lemma 2 after taking the limit as $k \to \infty$.

The proposition above it is the first one, and a similar fatal error has been repeated in this paper. Ironically, there is a video on "The Riemann Hypothesis and a New Math Tool (a new Indeterminate form)," particularly talking about this common error.

https://www.youtube.com/watch?v=GuGaNk727LU .

The fatal error is stating that the limit of 8K^3 is equal to the limit of 8K^6 as K goes to infinity. To put it simply, assuming all infinities (∞) are equal because we use the same notation for infinity is very wrong.

Consider the chronological progress table below:

K 8K^3 ≠ 8K^6

2 64 ≠ 512

3 216 ≠5832

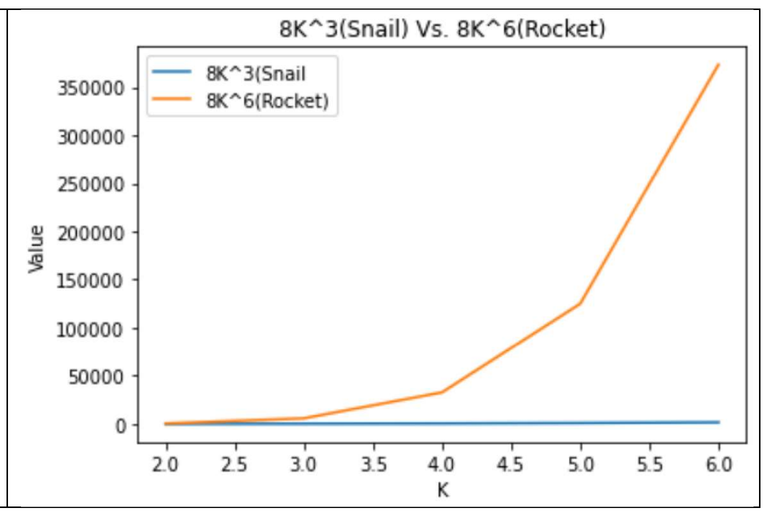
4 512 ≠ 32768

5 1000 ≠ 125000

6 1728 ≠ 373248

…

The assumption that a snail will be able to catch up with the speeding rocket is nonsensical for same reson assuming that all infinities (∞) are equal is false. It appears this false premise spills over from physics, where it has no justification in mathematics.



```
import matplotlib.pyplot as plt

K = list(range(2, 7))

R3 = [8 * k**3 for k in K]

R6 = [8 * k**6 for k in K]

plt.plot(K, R3, label='8K^3(Snail')

plt.plot(K, R6, label='8K^6(Rocket)')

plt.xlabel('K')

plt.ylabel('Value')

plt.title('8K^3(Snail) Vs. 8K^6(Rocket)')

plt.legend()

plt.show()
```

I tried to visualize your fatal error using the analogy of a snail and a rocket: The 'Snail = Rocket' or 'Snail - Rocket = 0' arguments have been repeated in version 13 quite a few times, and for those reasons, your claim is not correct.

In general, this attempt was false from the beginning because the Super Symmetric Equation (SSE) gives the correct answer as expected for all non-trivial zeros. The claim that is false comes from defining a wrong function that has nothing to do with SSE. If you claim two functions are equal, then you are claiming that one function produces zero and the other function gives you a non-zero value. That should be a strong clue that your newly proposed function is false. If the argument was correct, when we plug in 'non-trivial zero', SSE would have failed and produced a non-zero value.

Defining a wrong function and then providing counterexample examples for that wrong function under no circumstances can be considered a logical step. All it shows is that your new function is not equal to the original function, and the claim of equality is false.

Version 12 Notes

https://yutu.be/s3pHA4HTGPE

On July 21st, 2023, the user provided Iteration Version 12 via email. This version starts with a major problem where the author ignores the fact that ζ(s) is the analytic continuation of the series ∑(n=1 to ∞) 1/n's in the critical strip. This should be sufficient to debunk this claim. Please consider see my personal note for more detail. The claim at the beginning of the video is analogous to someone saying that 1+2+3... - 1/12 = 0, which is false for obvious reasons, as someone misinterprets the meaning of equality. -1/12 is the analytic continuation result for the series 1+2+3.... This is an invalid and unsupported operation that does not appear in any paper or argument by anybody, and for the same reason, it never occurs in the videos nor in Riemann's last theorem article.

$$\zeta(1-\bar{s}) - \zeta(s) = \lim_{b\to\infty}\left(\sum_{n=1}^{b}\left(\frac{1}{n^{1-\bar{s}}}\right) - \sum_{n=1}^{b}\left(\frac{1}{n^{s}}\right) + \frac{b^{\bar{s}}}{\bar{s}} - \frac{b^{1-s}}{1-s}\right)$$

The good point is that the numeric counterexample claim has disappeared from this version, which is a step in the right direction. However, the argument for version 10 and earlier is still present, where it remains merely a claim without any proof.

On July 2st 2023 the user provide this iteration version 12 stating . In this version Ignoring the fact ζ(s) = analytic continuation of ∑(n=1 to ∞) 1/n’s in above function and in general .

At first glance, this equation may seem hard to understand. However, the user chose to ignore the fact that ζ(s) represents the analytic continuation of the series ∑(n=1 to ∞) 1/n's. As someone who has seen Riemann's last theorem article, they know that there are two independent proofs for the transcendental zeta function. Moreover, there was a $10K bounty offered if anyone could disprove this function. Nevertheless, the user previously understood that the transcendental zeta function is correct, having verified and accepted its validity.

This is none related not correct answer regarding this comment .

Version 12 is supposedly in response to my comments on YouTube regarding Version 11. However, this response is unrelated and does not provide a correct answer to my comment, where I said, "Again, it makes no sense to assert that the analytic continuation of ∑(n=1 to ∞) 1/n^s and ∑(n=1 to ∞) 1/n^(1-s*) are equal, and yet also claim that ∑(n=1 to ∞) 1/n^s and ∑(n=1 to ∞) 1/n^(1-s*) are different.

There are some claims about the identity theorem that state both functions have to converge, which is not consistent with the sole purpose of the Identity Theorem. The Identity Theorem is the most important and fundamental concept in complex analysis and serves as the foundation for our claim connecting divergence functions to their convergence values. For example, it provides validation for claims like 1+2+3+...=infinity and 1+2+3+...=-1/12. Otherwise, one of these claims would be considered false in the given context. For more details, you can see here: https://www.0bq.com/IdentityTheorem.

The main reason we believe that the diverging Euler product in the critical strip is related to the converging zeros of the zeta function in the critical strip is due to the Identity Theorem.

All other questions and alarms were ignored and not addressed by the author. It's essential for a successful argument that all of their claims are correct. Replacing one or two false arguments with yet another false argument is not helpful.

For example, there is still a claim regarding a curve that has not been validly proven. In this and all prior iterations, I specifically asked for a clear proof for Φ(s) = e^{i α}. However, the author repeatedly claims that |e^{i α}| = 1 is sufficient to conclude that |Φ(s)| = 1, which is extremely false. In this version, the author argues that knowing Φ(1-s) = 1/Φ(s) is enough to make the claim, but this reasoning is logically flawed.

I have emphasized the importance of independently proving both |Φ(s)| = 1 and |e^{i α}| = 1. Merely stating that |e^{i α}| = 1 does not justify the claim that |Φ(s)| = 1 as well. The two statements must be proven independently and cannot be equated without proper justification. Providing evidence for |Φ(s)| = 1 is crucial if the author wants to claim the existence of a curve that makes Φ(s) = e^{i α}, because we know that |e^{i α}| = 1 and thus we must prove |Φ(s)| = 1. Therefore, this version is incorrect same as the previous one.

Despite my numerous requests, the author's responses persistently refer to well-known facts, such as |e^{i α}| = 1 or Φ(1-s) = 1/Φ(s), and mistakenly skip over the crucial need for a valid and substantiated claim. They assume that Lemma 5 somehow proves something about e^{i α} being equal to everything, but this is an erroneous assumption. Essentially, the author has demonstrated that they do not even consider the true meaning and significance of |e^{i α}| = 1.

Furthermore, even if we magically assume Lemma 5 is correct, there are other lemmas that are incorrect, as I have shown in earlier versions. Yet, the author believes that by solving this one lemma, the other issues will be ignored, which is not a valid approach to addressing the problems in the overall argument.

End Version 12 Notes(0bq.com/AAEC)

Version 11 Notes

Below is the @artificialresearching4437, I kindly ask you to take a moment to read and understand why the author seems to have no intention of answering questions correctly in the comment above. Firstly, the author skips through the comments and jumps to the end, apparently focusing solely on the known fact that |e^{i α}| = 1. I am specifically asking for a clear proof (paste it here) for Φ(s) = e^{i α}. Instead, the author states a proof for |e^{i α}| = 1, assuming it will be sufficient to conclude |Φ(s)| = 1, which is logically flawed. I have repeatedly mentioned the importance of proving both |Φ(s)| = 1 and |e^{i α}| = 1 independently. Merely stating that |e^{i α}| = 1 does not justify the claim that |Φ(s)| = 1 as well. Then, despite my numerous requests, his responses persistently refer to the well-known fact |e^{i α}| = 1. If you have a strong math background, please take a moment to read his paper, specifically Lemma 5, where the author seems to have no regards that to claim Φ(s) = e^{i α}, the author must prove that |e^{i α}| = |Φ(s)|, and the only way to do that is to independently demonstrate that |Φ(s)| = 1. You can find the paper here: 0bq.com/AACE. I never requested nor needed the fact that |e^{i α}| = 1 for this discussion; the author keeps proving it because that is the only part the author can comprehend. As a hint, I asked him to show the proof of why s^2 = e^{i α}, hoping that the author would realize the flaws in his argument. However, the author seems completely unaware about the fact thatα if s = 10, s^2 cannot be equal to e^{i α}. He mistakenly believes that Lemma 5 somehow proves something about e^{i α} equal to everything. Essentially, the author demonstrated that the author doesn't even consider the meaning of |e^{i α}|=1 and merely knows how to use the Pythagorean to prove it. I can assure you that the author doesn't take hints at all and remains stubborn in his misunderstanding. Ironically, at the end, the author questions my intelligence based on his level of understanding. I'm a proud member of the Mensa and the Intertel, and encountering someone rude like him just makes me sad that I cannot help them. He shows little to no respect for people and, for some reason in his mind, on multiple occasions, the author thinks the author can use it against others by asking intrusive questions.

@artificialresearching4437 response " My answer to the last comment is being deleted by the author, so I put it here. To put it correctly, I have found such a counter-example, but I argue with the author about the fundamental concepts of mathematics. So, my answer to the last comment is the following:

By the definition of complex number |z|^2 = Re^2(z) + Im^2(z). Therefore let us compute the absolute value of |e^{iα}|^2 = |cos(α) + i sin(α)|^2 = cos^2(α) + sin^2(α) = |Pythagorean theorem| = 1. So asking to prove that is nonsense. To answer your next question we can, actually, put another equation, but it would induce the different curve. Let me give you an example. Suppose that s^2 = e^{i α}. We can find two different curves, which satisfy this equation: s = e^{i α/2} and s = - e^{i α/2}. But only one of these curves satisfies the condition s(0) = 1. That is done with the local inverse concept and the concept of Riemann surface. For more detailed explanation, please, read Lemma 5. I would not state this without the proof of rigorousness. Please, take a closer look

Actually, the point is different because I have taken another interval, as you may see. And moreover, I take another partition of the interval. That is why your argument is not legit. And I can’t understand why do you ignore Lemma 5. What you say is nonsense, since you state that to prove that |\Phi(s)| = 1 along the curve I have to prove it for the entire complex plain. But that is absurd. I don’t believe that you really don’t understand what I’m talking about. Otherwise I simply do not understand, how did you get to Mensa.

@artificialresearching4437 I've noticed a pattern here; every time I ask for proof or explanations, you just run away and come up with nonsense that takes days to decipher. I have seen many times that you completely abandon the previous approach and make new claims. For instance, you first claimed that 0.50000000000000005076299623 - 4.019582094328109725710068j was the correct value, but when I showed you that it was wrong, you quickly abandoned that claim and presented another value along with a new claim, 0.50000000000000000097910646 + 0.532484207657510071799398j, using the same algorithm.This situation is confusing because both values come from the same algorithm, and if one of them is wrong, it indicates that the algorithm itself is flawed. You need to either demonstrate that both are correct or provide sensible reasons why one is correct and the other one is not.

For once in your life, read the comments below to understand and provide helpful answers. Also, please be polite and respond to each question one by one.

Below is wrong, and I don't know how to explain it, so I hope you invest some time and see your error. When I said, "You exceed machine precision," that means you can no longer trust what it gives you. To put it simply, I'm telling you that the machine may lie to you, and you cannot say, "Let me ask the machine."

eps = mp.mpf(1.0) # here we compute the machine error of the library mpmath

while 1 + eps != 1:

eps /= 2

You claim your algorithm found this numeric counterexample:

0.50000000000000005076299623 - 4.019582094328109725710068j

And then, allegedly with higher precision you claim this :

0.500000000000000009791064685531233313810718345426381319015761373680973073364580501735568008340442253516430419555933050441786919935577739798533782493544814318657780129088711671837212807891724880000466057195693472832149689880541555820093995507082759338550296230074536215007862944693072283577055668530375 + 0.532484207657510071799398515748960275214290052099343715595382442375072087036764958071896587831450772986045169801512801313551172262052087158353117033730742744310149739105877730030269049536363751865290412294365521568713864619937275239980107814764548131442785905582378781110973657330084735519607298784997j

Let me clean it up and see what we have:

0.50000000000000005076299623 - 4.01958209432810972571006 8j

0.50000000000000000097910646 +0.53248420765751007179939 8j

What do you see above?

First, you can observe that in the second round, the result is over 50 times closer to the critical line.

Second, you can see that the convergence leads to a completely different point. This is a consequence of exceeding machine precision.

Third, I already mentioned that you exceeded machine precision, and you still decided to ask the machine for information. When machine precision is exceeded, you cannot obtain reliable information from it, including logic.

Fourth, I advised you to use an intermediate theorem to demonstrate that the number you found is actually zero. However, you chose to ignore that advice. It is unclear why you think finding a number close to zero around the critical line for zeta(s) - zeta(1-s*) is a counterexample. Keep in mind that s and 1-s are almost the same, so attempting to calculate zeta function (σ=.5+-10^-17) and zeta(s) - zeta(1-s*) (where σ is close to 1-σ) results in a number like zeta = 0.000000000000000003831... After potentially thousands of iterations, there is nothing significant to find.

Please refrain from making numeric claims unless you have genuinely addressed the above problem.

I have no reason to believe that SSE is incorrect. This is the strongest point of RSLT based on the Uniqueness of Analytic Continuation and Identity theorem. If you have any claim, you need to demonstrate why you believe zeta(s) and zeta(1-s*) are equal, even though you claim they originated from different series. Again, it makes no sense to assert that the analytic continuation of ∑(n=1 to ∞) 1/n^s and ∑(n=1 to ∞) 1/n^(1-s*) are equal, and yet also claim that ∑(n=1 to ∞) 1/n^s and ∑(n=1 to ∞) 1/n^(1-s*) are different.

Also, I strongly advise you to wait and watch the video before making any claims regarding this matter.

So, for you next counter-example claim please address those 4 items .

Regarding your paper up to version 10, it was wrong, and I have no interest in reviewing version 11 before publish my next video. There are several fundamental problems that I have listed in my note, which can be found here: 0bq.com/AACE.

Regarding your last version, I have some concerns that you haven't addressed critical aspects, such as:

Could you kindly provide a clear proof (paste it here) for Φ(s) = e^{i α}? Additionally, could you explain why this proof is not applicable to other functions, for example, s^2 = e^{i α}? I have mentioned multiple times that it is necessary to prove both |Φ(s)| = 1 and |e^{i α}| = 1 independently. Simply stating that |e^{i α}| = 1 does not sufficiently justify the claim that |Φ(s)| = 1 as well. Your arguments appear flawed and confusing when you say |Φ(s)| = 1 because |e^{i α}| = 1.

For a correct argument, it is essential to demonstrate rigor in proving both |Φ(s)| and |e^{i α}| equal to 1 independently. Only then, based on the fact that 1 = 1, one can claim that there exist values α (s) that make Φ(s) = e^{i α} possible.

I believe you are capable of presenting a more robust analysis. This is an undergraduate problem, and I don't expect you to get stuck on this for so long.

Please address these concerns adequately.

Regarding your arguments in Version, it seems that the Version 10 answers apply to this version as well. However, as you know, I'm still super busy with the last video, and I'll rephrase my answer once I publish the video.

Regarding your numeric counter example

(0.50000000000000005076299623 - 4.019582094328109725710068j)

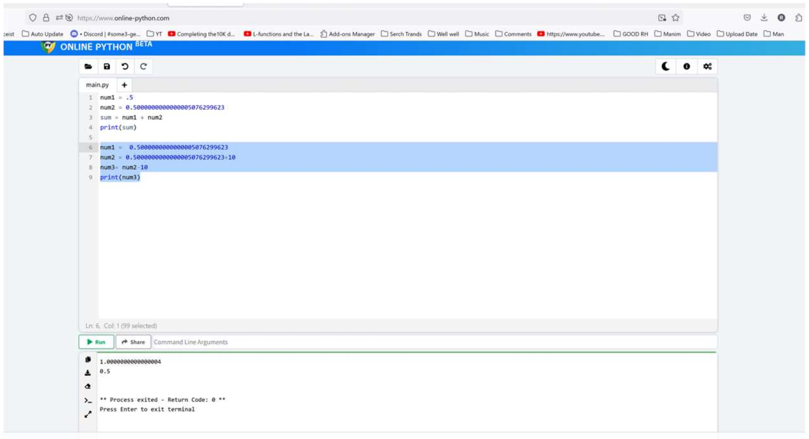
it's obvious that you obtained a false result due to exceeding the machine's precision. When you exceed the machine's precision, the machine starts producing inaccurate results. Simply put, you can't measure the atomic diameter using a ruler, and there isn't a ruler that can accurately do so. Please run the code below and let me know what you observe:

num1 = 0.50000000000000005076299623

num2 = 0.50000000000000005076299623 + 10

num3 = num2 - 10

print(num3)



So, the counterexample is actually incorrect, and it shows that SSE is correct up to the maximum machine precision of your machine. Additionally, please note the followings:

Firstly, this is a computational numeric counterexample where the machine's precision is not taken into account.

Secondly, you need to apply the intermediate value theorem to prove the existence of a zero. A value of 10^-18 is infinitely more significant than zero and cannot be considered as zero.

Also, I'm leaving the code here in case others want to provide a computational counter-example. It serves as a great example of how even verifying a numeric counter-example at this level can require significant effort and consideration.

```
import numpy as np

from mpmath import mp, findroot, zeta, gamma

from scipy import pi


mp.dps = 25


def Phi(s):  # computing Phi

    return 2 ** s * mp.pi ** (s - 1) * mp.sin(mp.pi * s / 2) * mp.gamma(1 - s)
```

```
def Phi_inv(x):  # finding the inverse to Phi
    def equation(s):
        return Phi(s) - x
    sol = findroot(equation, 0.5 - 1j, solver='mul')
    return sol


x = np.linspace(-pi, pi, 12345)  # Take 12345 points on the interval (-pi, pi)
Phi_inv_values = [Phi_inv(np.exp(1j * xi)) for xi in x]  # compute the values of Phi_inv
max_distance_index = np.argmax(np.abs(np.real(Phi_inv_values) - 1 / 2))  # look for the biggest difference
max_distance_s = Phi_inv_values[max_distance_index]  # computing s
result = zeta(max_distance_s) - zeta(1 - max_distance_s.conjugate())  # check the value of zeta-function difference
print("Zeta diff =", result)
print("s =", max_distance_s)
```

End Version 11 Notes(YouTube/@rslt)

End Version 10 Notes

Lemma 1 and 2 appear to be correct in their statements, but the proofs may have some flaws. There is no need for an additional proof, and you can state the result as a direct consequence of RSLT (not SSE).

Lemma 3. *$\Phi(s)$ and $\Phi(1-s)$ are multiplicative inverses.*

This Lemma 3 appears to be correct.

ζ(s)/ ζ(1-s)* ζ(1-s)/ ζ(s)

Lemma 4 Version 10:

need one lemma, which justifies the counter-example we would find further.

Lemma 4. *Suppose that the function $f : (-L, L) \to \mathbb{C}, 0 < L \leq \pi$ is analytical in some neighbourhood of the real interval and satisfies the following functional equation:*

$$f(t) = -e^{it} f(-t).$$

Then f is identical zero function.

The lemma presented in the provided context lacks coherence. Even if we were to assume its validity, the subsequent claim lacks proper explanation and is introduced as a consistent method without offering any valid proof or referencing relevant sources.

4 Building the counter-example

Lemma 4 introduced us the sufficient condition of our curve to be the curve of counter-examples. However, it is not necessary, which I point to avoid the discussion of "counter-examples" to my statement. For the simplicity we shall study the equation $\Phi(s) = e^{i\alpha}$ for some $\alpha \in \mathbb{R}$. Let us study this equation from the geometric perspective.

Lemma 4 Version 7:

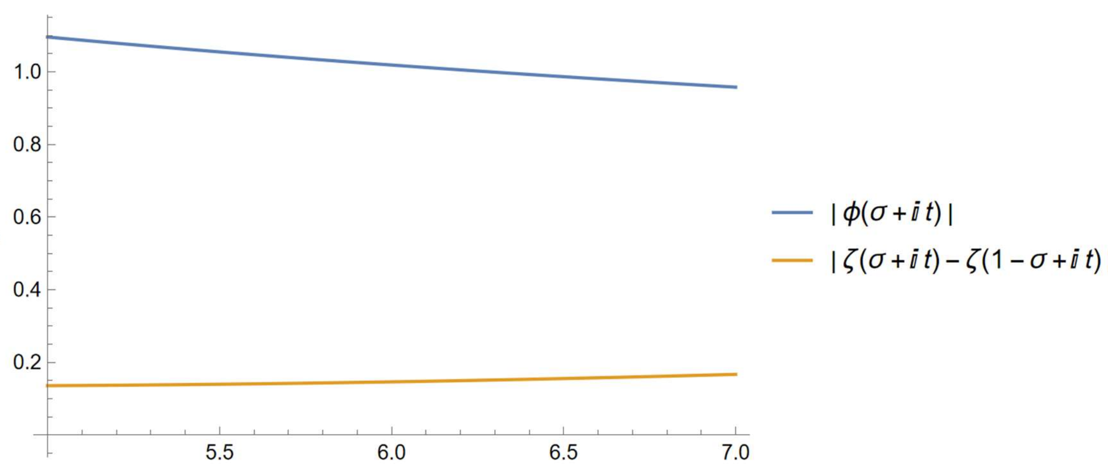
□

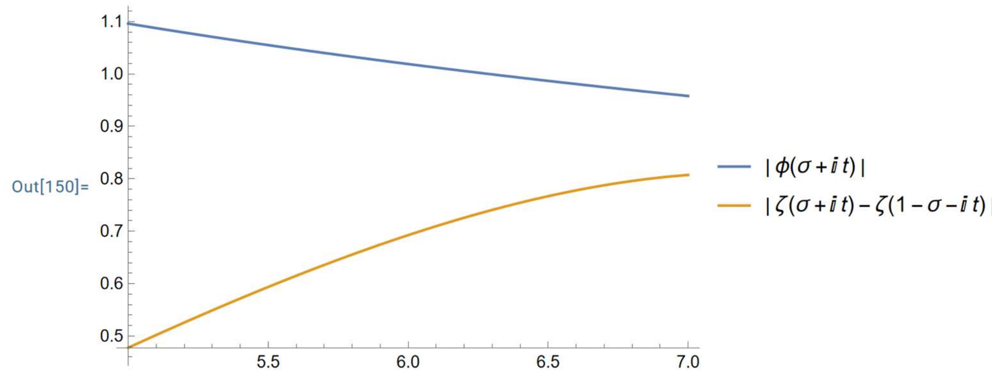
Lemma 4. *Let $\epsilon > 0$ be the imaginary part of the closest to the real line point, where $\zeta(s) = 0$ in the critical strip. Then $\zeta(s) - \zeta(1 - \bar{s}) = 0 \iff |\Phi(s)| = 1$ in the domain $\{s | \Re(s) \in (0, 1), \Im(s) \in (-\epsilon, \epsilon)\}$.*

$t \in (5, 7)$

$\sigma = .9$

Numeric Counterexample





Let me explain what the numerical counterexample for Lemma 4 means. You can see a descending blue line that starts above 1 and ends below it. At the same time, you can see an orange line above zero, which proves that at some point ϕ(s) equals one while ζ(s) - ζ(1-s*) is not zero. Therefore, Lemma 4 is false, and all the subsequent lemmas that are based on it are also false.

We cannot assume that ε is zero simply because it is very close to zero. As you stated, ε > 0 meaning that ε ≠ 0, so we need to be consistent and acknowledge that ε can be zero or nonzero.

According to your definition for the zeros of zeta functions, either |ζ(s+ε)-ζ(1-s+ε)| > 0 or |ζ(s+ε)-ζ(1-s-ε)|≠0 and |Φ(s+ε)| ≠1. Additionally, Φ'(s) is not equal to Φ'(s+ε). For example, consider the derivative of |x| at zero, which is undefined (according to mathematicians). At -ε, it is -1, and at ε, it is 1.

Lemma 4. *Let* $\epsilon > 0$ *be the imaginary part of the closest to the real line point, where* $\zeta(s) = 0$ *in the critical strip. Then* $\zeta(s) - \zeta(1 - \bar{s}) = 0 \iff |\Phi(s)| = 1$ *in the domain* $\{s | \Re(s) \in (0, 1), \Im(s) \in (-\epsilon, \epsilon), \Phi^4(s) - 1 \neq 0\}$.

New version of lemma 4 is False:

$$\Phi(s)^4 - 1 \neq 0 \ \Leftrightarrow \ \Phi(s)^4 \neq 1 \ \Leftarrow \Phi(s) \ \neq \pm 1 \ \Leftarrow |\Phi(s)| \ \neq 1.$$

$$\Phi(s)^4 - 1 = 0 \ \Leftrightarrow \ \Phi(s)^4 = 1 \ \Rightarrow \Phi(s) \ = \pm 1 \ \Rightarrow |\Phi(s)| \ = 1.$$

$\Phi(s) \in \mathbb{C}$. |Φ(s)| cannot be and not equal to 1 simultaneously.

The response below is not acceptable, and no further communication on this matter is recommended.
"|Φ(s)| = 1 does not imply Φ^4(s) = 1, so this is correctly defined. If you remember some basics of geometry from the middle school, you know that cos^2(x) + sin^2(x) = 1 and hence Φ(s) = e^{i α} is well-defined and it does not necessarily satisfy this polynomial equation."

The absolute value of 1 does not mean that the 4-th power would be one. Please, try cos(\pi/16) + i sin(\pi /16). The square of the absolute value here is cos^2(\pi/16) + sin^2(\pi/16) = 1, but due to the deMoivre's formula the fourth power is the following:

cos(π/4) + i sin(π/4) = \sqrt(2)/2 + i \sqrt(2)/2 \neq 1. You may find all of the needed information here:

https://en.m.wikipedia.org/wiki/De_Moivre%27s_formula

Above shows that proves $1/2 + 1/2 = 1$. In other words, it shows that $|\Phi(s)| = 1$ does not imply $\Phi(s) = 1$ and has no relevance to this topic. Lemma 4 is false.

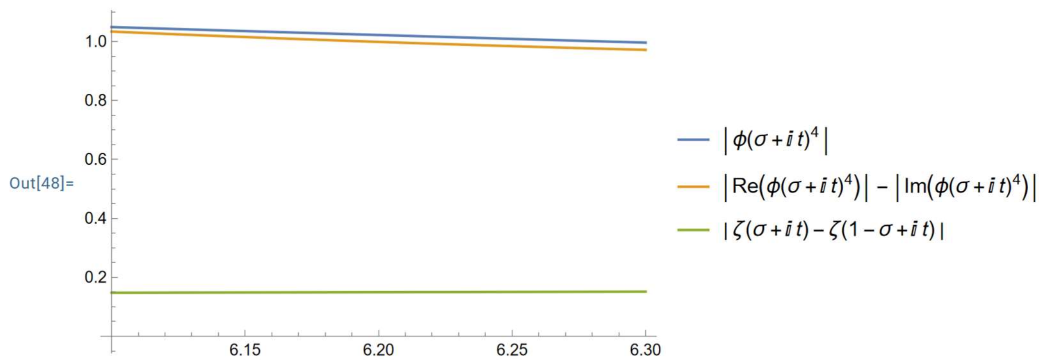
Note that $|\Phi(s)^4| = |\Phi(s)| = 1$

Below is numerical counterexample that lemma 4 doesn't hold.

t ∈ (6.1, 6.3)

$\sigma = .9$

$\Phi(s)^4 - 1 \neq 0$ and $|\Phi(s)^4| = 1$

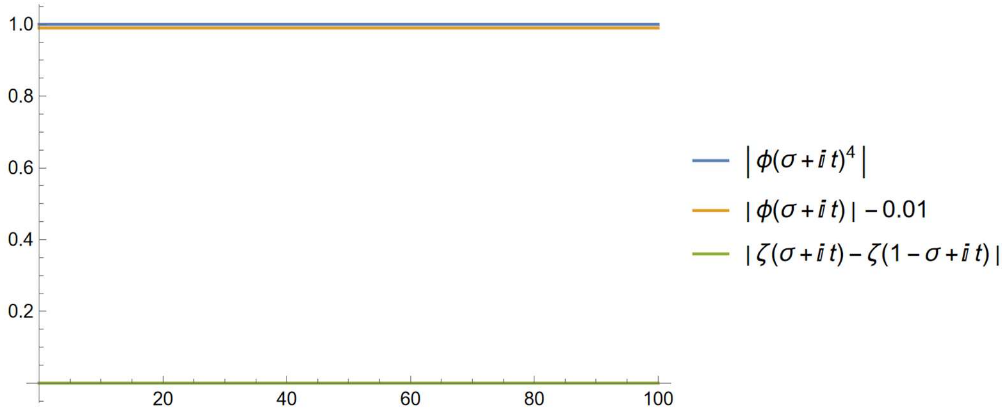


Here is the computational proof I have. I intentionally subtracted 0.01, and I will not respond to any variation of the proof. It will not lead us anywhere, and it is not an efficient use of our time. However, please keep in mind that we have no obligation to read or review your paper. At this point, I am only looking for a numerical counterexample.

t ∈ (0, 100)

$\sigma = .5$

Out[28]=



Lemma 5 Version 10:

Lemma 5. *The equation* $\Phi(s) = e^{i\alpha}, \alpha \in U \subset \mathbb{R}$ *defines at least one analytical curve on the complex plain* $s(\alpha)$, *where* U *is some real symmetric interval, containing* 0.

It appears that the author acknowledges that Lemma 4, Version 7 was incorrect. However, instead of addressing the issue appropriately, the author replaces it with an absurd lemma that has no connection to the rest of the paper. the author ignores the fact that there is no proof that |\Phi(s)| = 1, which is required for any claim that \Phi(s) = e^{i\alpha}, since e^{i\alpha} = 1. Simply because |\Phi(s)| is not equal to one, there is no possibility for equality. Once again, without any valid reason, the author claims that attempting to prove the existence of the curve will somehow demonstrate that |\Phi(s)| = 1.

Furthermore, the author has failed to address prior comments that are applicable to this version. It remains unclear why the author believes that if \Phi(s) = e^{i\alpha}, then \Phi(s) e^{-i\alpha} - 1 = 0, which is a variation of the original function, can provide any useful and reasonable argument.

Lemma 5 Version 7:

Lemma 5. *The equation $\Phi(s) = e^{i\alpha}, \alpha \in \mathbb{R}$ defines at least one analytical curve on the complex plain $s(\alpha)$.*

Proof. Let us rewrite this equation in the following form:

$$F(\alpha, s) := e^{-i\alpha}\Phi(s) - 1 = 0.$$

Take the derivative of F with respect to s:

$$\tfrac{d}{ds}F(\alpha, s) = e^{-i\alpha}\Phi'(s).$$

Since $\Phi(s)$ is a non-constant analytical function, the zeroes of $\Phi'(s)$ would be a set of izolated points. Therefore in the neighbourhood of any point on the complex plain we can find a point, where $\Phi'(s) \neq 0$. Hence by the Implicit Function Theorem we obtain the statement of the lemma. □

The next thing we would like to show is that the real component of this curve is non-constant.

$$\frac{d}{ds}e^{-i\alpha}\Phi(s) - 1 = 0 \quad \Rightarrow \quad e^{-i\alpha}\Phi'(s) = 0$$

Assuming $\Phi'(s) \neq 0$ that means $e^{-i\alpha}=0$.

You cannot use any s you want; you must use the condition $|\Phi(s)|=1$. If you use a different s because $\Phi'(s)=0$, let's say s1, there is no reason to assume that $|\Phi(s1)|=1$.

If you want to say that we are studying the critical strip regardless of $|\Phi(s)|=1$, then you have no reason to say in Lemma 6 that the curve $s(\alpha)$ must be on the critical line.

You as you are not using it correctly The Implicit Function Theorem and neighborhoods. For example, please consider the function F(x,y) = x^2 + y^2 - 1. And let me know why you think that it's satisfied at the points (0, ±1) because it's satisfied in the neighborhood?

Let F(x,y)=x^2+y^2-1 and the implicit function theorem is not satisfied at the points (0,±1)

Lemma 6. *Let $s(\alpha) = l(\alpha) + it(\alpha)$ be a curve, defined by the equation $\Phi(s) = e^{i\alpha}, \alpha \in (-\pi, \pi)$ such that $s(0) = \frac{1}{2}$. Then $l(\alpha) \neq const.$*

Lemma 6 states that l(α) cannot be constant, including the value of 1/2. This leaves us with two possibilities:

1. The lemma is referring to a path that has no direct connection to ζ(s) = ζ(1-s). If this is the case, then the relevance of the lemma is unclear.
2. The lemma is implying that ζ(s) & ζ(1-s) cannot be equal on any straight line including the critical line. As far we know all non-trivial zeros of the zeta function lie on the critical line and ζ(s) = ζ(1-s) in that line.

Therefore, we can conclude that Lemma 6 is either irrelevant or incorrect in SSE context.

There is no requirement for the path or analytical curve of α to be constant unless you show in lemma 5.

According to Lemma 5 $e^{i\alpha}\Phi(\mathrm{s}) = 1$ and Lemma 3 $\Phi(\mathrm{s})\ \Phi(1-\mathrm{s}) = 1$ thus $e^{i\alpha} = \Phi(1-\mathrm{s})$

Also α=$-i\ ln\ (\Phi(\mathrm{s}))$

Because Φ(s) is none constant analytical function therefore Φ(1-s) is non-constant function.

$$it^{'}(\alpha)\Phi^{'}(\tfrac{1}{2} + it(\alpha)) = ie^{i\alpha},$$

$$it^{'}(\alpha)\Phi^{'}(\tfrac{1}{2} + it(\alpha)) = i\Phi(\tfrac{1}{2} + it(\alpha)),$$

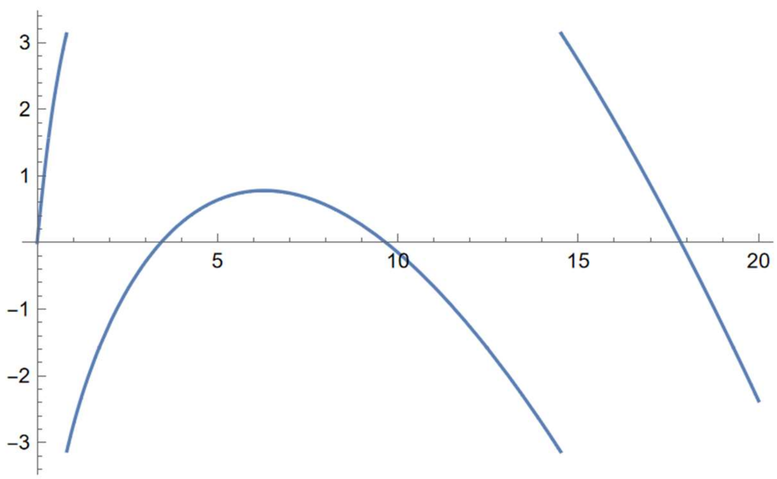
$$t^{'}(\alpha)\Phi^{'}(\tfrac{1}{2} + it(\alpha)) = \Phi(\tfrac{1}{2} + it(\alpha)).$$

Let's define g(s)=f(u) then we have g(s)-f(u) =0 take divertive d/du give us s'g'(s)-f'(u)=0 because RHS is zero that means s'g'(s)-f'(u) is even and odd and there are no contractions.

Take $t(\alpha)$ to be an odd parameterization of the imaginary part of the curve, since $e^{-i\alpha}$ is conjugated to $e^{i\alpha}$ and it preserves conjugation by the Schwarz Reflection Principle. Then by the Schwarz reflection principle $\Im[\Phi(\frac{1}{2} + it(\alpha))]$ is an odd function. But the derivative of this function with respect to $it(\alpha)$, i.e. $\Im[\Phi^{'}(\frac{1}{2} + it(\alpha))]$ should be even as the derivative of an odd function. Therefore $t^{'}(\alpha)\Phi^{'}(\frac{1}{2} + it(\alpha))$ is an even function as the product of two even functions since $t^{'}(\alpha)$ is even as the derivative of an odd function. This means that $\Im[\Phi(\frac{1}{2} + it(\alpha))]$ is even and odd at the same time, which is only possible for the constant zero function. But $\Im[\Phi(\frac{1}{2} + it(\alpha)))] = \sin\alpha \neq 0$ constantly by the construction, hence we obtain a contradiction. This means that $l(\alpha) \neq const.$ □

Lemma 7. *Let $s(\alpha)$ be a curve from the Lemma 6. Then $s^{'}(\alpha) \neq 0$ and $\Phi^{'}(s(\alpha)) \neq 0$ for all $\alpha \in (-\pi, \pi)$.*

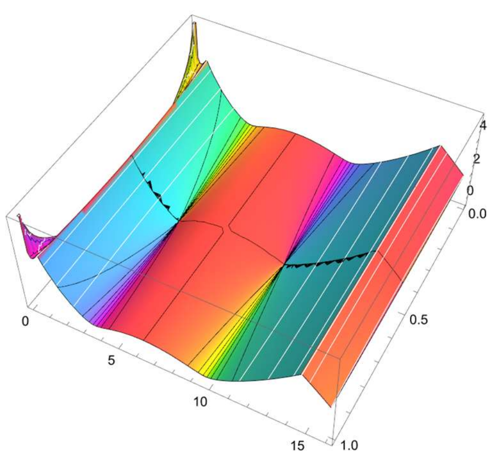
α is not a continuous function, and you cannot take derivative of s (α) with respect to α. Also, you cannot use any chain rule to differentiate s (α) implicitly. I plotted α(s) =-I log(Φ(s)) on critical line. As stated in Lemma 7 α ∈ (−π, π) which that means every time you reach α=π it must jump to – π and vice versa.



Furthermore, you have specified that α belongs to an open interval, excluding the points π and -π. This implies that α is not continuous at those points, which means that α'(s) or s'(α) does not exist at π and -π.

Contour shows that there is no Analytical path for α

Out[117]=




```
In[123]:= ep = .01;
          Z = N[ZetaZero[1]];

In[125]:= Alfa[s_] := -I Log[si[s]];
          AbsArg[Alfa[Z + .1 + I ep]]
          AbsArg[Alfa[Z - .1 - I ep]]

Out[126]= {2.83476, 3.11297}

Out[127]= {2.81855, -3.11286}
```