$0.\overline{9} \neq 1$. Per Jovem! By Jupiter!

$0.\overline{9}$ (*zero point recurring nine*)
WOULD be: nought point infinitely many nines,
but infinity is *unattainable*, *uncome-at-able*!
And infinity is ***not*** a ***number***!
Only valid reference is: ***approaching*** infinity: $\rightarrow \infty$, ***not***: $= \infty$!

In **this** very document, *approaching* does *not* mean: *reducing the "distance"*
(which is malarkey as far as infinity is concerned), but *"moving towards"* it
& no matter how far you move, it ***will*** forever remain infinitely far away! You'll *never ever reach* it!

Therefore,
infinite entities ***cannot*** & ***do not*** exist!
Oops! I have not yet defined what "exist" means.
And I won't.
infinite entities are ***impossible***!
Whether they are abstract or concrete!

But the number ***one*** ***IS*** possible,
e.g. while writing this, I am drinking *one* cup of coffee.

HOW CAN something ***impossible***
equal something ***possible***?

A standard way of solving recurring fractions
is to use a *geometric series*:

$$\text{if } |x| < 1 \text{ then } \sum_{k=0}^{\infty} x^k \neq \frac{1}{1-x}$$

Same story! infinity is *unattainable*!

Correct is:

$$\text{if } |x| < 1 \text{ then } \lim_{n\to\infty} \sum_{k=0}^{n} x^k = \frac{1}{1-x}$$

This sum will better and better ***approach*** this
asymptote as ***n*** grows, but ***never ever*** reach it!
"***Asymptote***" is derived from Greek.
A = *not*, ***sym*** = *together*, ***ptotein*** = *to fall*,
hence, it means: ***NOT*** *falling together*.

A PROOF touching infinity (which is untangible!), is JUNK!
A PROOF using infinity as were it a *number* is JUNK!

I'll have another coffee. After all, two too is possible.
(And then I may have to bring the remainder of the two at two to two to the loo, too).

Geometric series

Define: $y := \sum_{k=0}^{\infty} x^k = 1 + x + x^2 + x^3 + \cdots$

then: $xy = x + x^2 + x^3 + x^4 + \cdots$

Both tails yield the same, so subtracting one from the other renders Sweet Fanny Adams,

yielding: $y - xy = 1$

i.e.: $y(1-x) = 1$

hence: $y = \sum_{k=0}^{\infty} x^k = \frac{1}{1-x}$

WRONG! Those tails are ***not*** equal! xy ***always*** has one term more than $y - 1$, which, even if $|x| < 1$, ***never*** equals zero, except in the trivial case where $x = 0$.

CORRECT: $y_n = \sum_{k=0}^{n} x^k = 1 + x + x^2 + \cdots + x^n$

then: $xy_n = x + x^2 + \cdots + x^n + x^{n+1}$

so: $y_n - xy_n = 1 - x^{n+1}$

therefore: $y_n(1-x) = 1 - x^{n+1}$

hence: $y_n = \frac{1-x^{n+1}}{1-x} = \frac{1}{1-x} - \frac{x^{n+1}}{1-x}$

Please note: y_∞ **is UNDEFINED!** $\infty \neq$ **a *number*!**

We obtain: $\lim_{n\to\infty} y_n = \frac{1}{1-x}$ ***IFF*** $\lim_{n\to\infty} \frac{x^{n+1}}{1-x} = 0$ (*this* requires: $|x| < 1$).

As long as n is ***finite*** (which it ***IS***, since it's only ***approaching*** ∞)

and $x \neq 0$ we have: $\frac{x^{n+1}}{1-x} \neq 0$ (even if $x = 1$, since $1/0 \neq 0$)

hence: $\forall n \in \mathbb{N}_0 : y_n \neq \frac{1}{1-x}$ asymptotes are ***UNCOME-AT-ABLE!***

Correct: $\lim_{\#\text{digits}\to\infty} (0.9\cdots) = 1$ but limits (cf. *speed of light*!) are ***UNREACHABLE!***

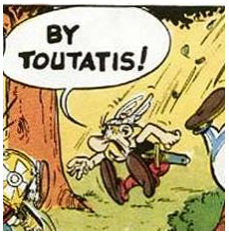
Truly endlessly recurring fractions are *impossible*!

∞ is ***unattainable*** and ***not*** a ***number***!

$0.\overline{3} \neq 1/3$, $0.\overline{6} \neq 2/3$, $0.\overline{9} \neq (3/3 = 1)$, $0.\overline{142857} \neq 1/7$, etc.

As a matter of fact, such fractions actually have ***NO*** *exact* decimal equivalent.

Ex falso sequitur quodlibet! *From falsehood follows whatever you like.*



The *physical* (non)sense of ∞ should be evident. Would we try to denote the fractional part of $0.\overline{9}$ with just one atom per digit, we'd encounter the *fact* that the *entire universe* contains not more than $\sim 5.24 \times 10^{79}$ (hydrogen) atoms[1], which is a ***finite*** number.

And, for the same reason as already mentioned, there ***cannot*** be an ∞ *absolute* **nothing**.

Would the *absolute* **nothing** ***exist***, it would be **something**.

Doesn't this imply there ***must*** be **something** ***outside*** the ***finite* cosmos** as we know it?

Let's call it the ***superCosmos***. Can *that* be ∞? I think not.

Shouldn't there then also be a ***hyperSuperCosmos***, which neither can be ∞?

Shouldn't we keep reasoning this way, irrefutably rendering ***endless*** recursion into an

ultraExtraOompaLoompaFleeflahBlablahHenkyPanky···HyperSuperCosmos?

But isn't ***endless*** the very ***meaning*** of ∞?

Ergo: ***impossibility*** of ∞ ultimately implies ***impossibility*** of ***finitude***...

I see nobody on the road, said Alice.
I only wish ***I*** *had such eyes*, the King remarked
in a fretful tone. *To be able to see Nobody!*

[1] See https://henk-reints.nl/astro/HR-Geometry-of-universe-slideshow.pdf

There are many well-known ***paradoxes*** based on infinity,
for example **Hilbert's Grand Hotel** which would have infinitely many rooms.

WELL, THAT SIMPLY IS IMPOSSIBLE!

It uses an IMPOSSIBILITY as a premise!

Ex falso sequitur quodlibet! Per Jovem!

From falsehood follows whatever you like! By Jupiter!

Hilbert's Grand Hotel can accommodate ***zero guests***,
since this hotel ***cannot*** & ***does not exist***.

As already mentioned, the universe holds not more than $\sim 5.24 \times 10^{79}$ atoms[1],
yielding an infinite ***shortage*** of building material!
Even in the abstract mathematical world this hotel is IMPOSSIBLE,
as explained above. Infinity is ***uncome-at-able***, **even abstractly**!

Moreover, the paradox premise makes it start ***fully occupied***.
As said, there are merely $\sim 5.24 \times 10^{79}$ atoms in the universe,
so what does the infinite surplus of these infinitely many guests consist of?

And then each guest should move to the next room,
in order to make place for a newly arrived guest.
One cannot arrive at something impossible.

Would this shifting of all guests be attempted by telling the guest in room 1 to move to the next room, making him forward this command to *that* guest etc., the chain of relocations would propagate as a wave, which ***cannot exceed*** the ***finite speed of light***,
so it would take infinitely long. Does that make sense?
Would all guests instead be informed by one single message via some infinitely large communication network, it would, due to the very same ***speed limit of light***, still take infinitely long to complete the operation. Maybe that makes sense? I think not!
Said René Descartes and suddenly, he no longer existed.

ALL paradoxes based on infinity are complete nonsense, flapdoodle!

They should be ***firmly rejected*** instead of being taken seriously!

One should always start reasoning with premises that can be considered true,
hence a ***finite*** no. of items, and then see what will happen if the no. of items grows towards (but never ever reaching!) infinity. But please keep in mind this no. will always remain ***finite!***
Its initial state is ***fully occupied*** and after each & every increment
of the room count, the initial state will once again be ***fully occupied***, so
for ***any*** finite room count, there will ***never ever*** be room for ***another guest***,
no matter how many increments are performed!

Only simplistic people consider infinity something possible.
Jawohl, mein lieber David![2]

Beati pauperes spiritu. — Blessed be the poor in mind.
Matthew 5:3.

[2] Did you know David Hilbert was a German? So please try to pronounce it as Deutsch as possible.

A contiguous & bounded manifold ***does*** (in an abstract sense) consist of infinitely many zero-sized points, but they are all clumped together. However, would one try to separate them into an infinite set of discrete zero-sized entities, one tries to achieve something UNCOME-AT-ABLE!

Should infinite sets be considered ***sets*** at all?

The Banach–Tarski paradox contradiction.

See: https://en.wikipedia.org/wiki/Banach%E2%80%93Tarski_paradox,
which opens with:

> The Banach–Tarski paradox is a theorem in set-theoretic geometry, which states the following: Given a solid ball in three-dimensional space, there exists a decomposition of the ball into a ***finite*** number of ***disjoint subsets***, which can then be put back together in a different way to yield ***two identical copies of the original ball***. Indeed, the reassembly process involves only moving the pieces around and rotating them, without changing their original shape. However, the ***pieces*** themselves are not "solids" in the traditional sense, but infinite scatterings of points.

(Highlighting done by ***me***).

Well, there we are!

The PIECES are infinite amounts of ***disjoint discrete zero-sized points***.
Infinite amounts? IMPOSSIBLE!
Those are not PIECES!

Going all the way to infinity, which — even abstractly — is IMPOSSIBLE,
then & there invisibly "multiplying" the whole bunch by two,
and finally coming back from infinity, which too is IMPOSSIBLE.
It is just as STUPID as dividing by zero!

$\lim_{x\to\infty} ax$ obviously equals $\lim_{x\to\infty} bx$
Therefore: $a = b$. Quod Erat Fabricandum!
After all, both limits equal infinity, don't they? Yes, they don't, do they?
But I won't call you a moron, dunce!

Uncome-at-able, even abstractly!
It will *always* remain infinitely far away,
no matter how much you do your utmost to approach it.

Would you however ***define***:

$$0.\overline{9} := \lim_{\#\text{digits}\to\infty} (0.9\cdots)$$

then it becomes merely another *notation* for the same,
and yes, this *limit* equals one, so then

$$0.\overline{9} = 1$$

which would apply similarly to all other recurring fractions.

But please keep in mind this now is the ***limit***, the ***asymptote***.

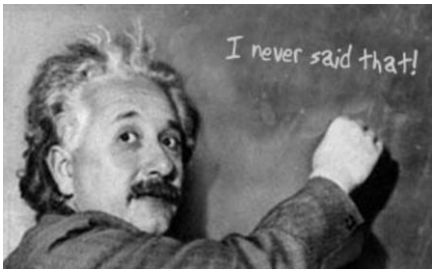
Remember the meaning of the word ***asymptote***?

However, there ***is*** an exception:

If consecutive timespans follow a geometric or similar series (e.g. those of a bouncing ball losing some fixed percentage of its energy at every bounce), then you ***will*** reach the limit of an infinite amount of timespans and time will even progress ***beyond*** it. But let's now do physics. The bounces of the ball will become so small that they can no longer be distinguished from the thermal noise of the entire setup and then you can no longer speak of *bouncing*. Bingo! It bounced some ***finite*** no. of times. What if there would be no thermal noise, i.e. if it is done at 0 K? Erh, that's another uncome-at-able limit (3rd law of thermodynamics) and, most probably, the ball would instantly go to smithereens when it first hits the floor. Or it would simply not bounce, due to a total loss of elasticity & resilience. And its kinetic energy ***will*** be converted to thermal energy, thus raising the temperature. And even if it would bounce to the limit, the timespans & bounce heights would need the become arbitrarily small. Most physicists are convinced that's impossible (quantum mechanics, Planck units, etc.), although there exists no true observational evidence for the latter. In an abstract sense, i.e. when doing maths only, it ***would*** be correct that the limit is even exceeded. But this mathematics is (once again) about a **non-reality**. Ex falso quodlibet. Einstein: *Pure logic yields empty statements*.

See also: https://henk-reints.nl/HR-Gabriels-horn.pdf
as well as: https://henk-reints.nl/HR-atomic-distance-and-time.pdf

Two things are infinite:
the universe and human stupidity,
and I'm not sure about the former.



He never wrote that.
Ceci n'est pas Albert Einstein.

Henk Reints
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