

Re: Two results of set geometry

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- *From:* Tony Orlow <tony@xxxxxxxxxxxxxx>
 - *Date:* Fri, 26 Oct 2007 14:53:29 -0400
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David R Tribble wrote:

stephen wrote:

I am saying that a square of finite dimensions is not infinitely tall.

Tony Orlow wrote:

You are being woefully unimaginative. Picture a square of infinite dimensions [sic], consisting of unit squares of uncountable number.

David R Tribble wrote:

If it's infinite, it doesn't have any edges, so how do we know it's an infinite square, and not, say, an infinite triangle or pentagon? Or circle?

Tony Orlow wrote:

Why doesn't it have edges.

Maybe because it's infinite? Where are they?
How far away from the center of the square are these edges?

Infinitely distant.

Does an infinitesimal square have edges?

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I guess that depends on what an "infinitesimal square" is, doesn't it? Is that a square that's as small as a point? Smaller? Can an edge be as small as a point?

A point might be considered a square of size 0, really being four points in the same location, but I mean a square with an infinitesimal nonzero side.

What is the definition of "square", as opposed to "finite square"?

I guess that, too, depends on what a "finite square" is, huh? All the squares I've ever seen had finite areas, so maybe that's related to what you think you mean.

Just define "square".

Tony Orlow wrote:

Now, zoom infinitely out, so that you can actually see the square,
such that it appears to be one unit in size.

David R Tribble wrote:

How is that done? If it's infinite in extent, there is no vantage point from which it doesn't look infinite in both directions. Are you saying it's not really infinitely wide?

Tony Orlow wrote:

Sure it is, but you are at an infinite distance, and therefore it's all viewable.

It's all viewable from any *finite* distance, obviously. Every point on the plane – sorry, square – is a finite distance from the viewpoint. (Kinda like every natural in \mathbb{N} is finite, huh?)

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Um, no. I am not talking about some countably transfinite square, but an uncountably large one, when measured in finite units. You will not be able to detect the edges from any finite distance.

What makes you think any finite point would be visible from an infinite distance? You seem to be contradicting things you've said previously about things on the "finite level" and the "infinite level".

I don't think so. I never said that you could distinguish any finite portion of the square from an infinite distance, but that you could view the entire infinite object, corners, edges and all.

David R Tribble wrote:

But assuming that "zoom infinitely out" has meaning, wouldn't the square (which everyone else would call a "plane") look like a single point when viewed from an infinite distance?

Tony Orlow wrote:

No, because it is infinitely wide. If the width is x and you are x distance from it, it will cover only a finite angle from your viewing angle. Why is that different for infinite x ?

Why should it be the same?

Because it's the same picture, whether you measure in 1's or Big'Uns.

Using your own logic,

there is no point in the square that's infinitely far from the center (just like there's no natural in \mathbb{N} infinitely greater than zero).

I never said that. You don't understand what I'm saying because you're reading your own conceptions into it. A countably infinite square, or circle, or any geometrical object, simply doesn't make sense. Edges are missing in that case. But an uncountably infinite object may very well have well defined features. That's what I'm talking about. Edges that are infinitely distant from each other.

All the points in the square are

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finitely distant from the center, so why would you see any of them at an angle greater than 0 from an infinite viewpoint?

I wouldn't, if that were what I were talking about.

Tony Orlow wrote:

At this point, the unit squares of which it consists have shrunk to infinitesimal elements, as the infinite square has shrunk to a finite size.

David R Tribble wrote:

So now we can see edges of the square?

Tony Orlow wrote:

Yes, we are infinitely distant, so we can see the entire extent of the infinite square.

David R Tribble wrote:

How many points are on those edges?

Tony Orlow wrote:

Big'Un, let's say.

And how far are those points from the center of the square? Because all the points in my square are finitely distant from the center. How about yours?

How far are the edge points from the center of a square of side x ?

The points range from $\text{Big'Un}/2$ in the middle of the side to $\text{Big'Un}/\sqrt{2}$ at the corners.

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David R Tribble wrote:

And what about the center of the infinite square?

Tony Orlow wrote:

What about it?

Where is it? Halfway between the infinite edges?

Yes.

Can I see the point that's halfway between the center and the right edge? Is that the point at $\text{BigUn}/2$ (or maybe $\text{BigUn}/4$, I'm losing track) that's a finite distance from the center (because all the points in my square are a finite distance from the center)? I forget, is $\text{BigUn}/2$ a finite number or not?

No, BigUn is uncountably large, which is why it's the length of the side of the square. It's an uncountably large square.

Peace,

Tony

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