Re: how to list all of the real numbers

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- *From*: Jonathan Hoyle <jonhoyle@xxxxxxx>
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On Aug 13, 3:32 pm, "Ross A. Finlayson" <r...@xxxxxxxxxxxxxxx> wrote:

> Well−order the reals, i.e., biject the set of real numbers to an initial segment of an ordinal. Then, apply "Cantor's first" or nested intervals as it is sometimes called, that each sucessive element brackets the remaining interval. Then, besides whether c = Aleph_1, Aleph_2, ..., where it is said to be consistently equal to each of those with the undecideable continuum hypothesis, yet none of them, besides that, consider: does there not always exist each real number of a segment of the continuum in the remaining bracket/interval?
>
> That is where, if some initial segment of the ordinal O equivalent to c led to a degenerate interval, for example [0,0] containing only the point/scalar/number 0, then there is a question as to whether the continuum's cardinality is thus simply equivalent to a lesser cardinal than O's.

It is not. You will always run into a degenerate interval at some limit ordinal prior to c, thus undoing your "proof".

> Similarly to how other considerations lead to that the real numbers have a cardinality greater than any given ordinal, it leads to an argument that they then as well have a cardinality less than any given ordinal to which they are equivalent. This was discussed further some year and so ago in "On well−ordering(s) of the reals, infinity."

It was nearly two years ago, and yes it was in that discussion where your outline was proven to be faulty. I could go over your logic flaw again, but it was detailed pretty well at the time, and you might just simply re−read that posted topic to refresh your memory.

> Then, where a real may be a mark of a point, consider whether Hardy would accept that each mark of a point, or simply point, would

> represent a real number. Then, there is a question: how can there be marked each point on the unit interval? Cantor's nested intervals rreesult would have that any attempt to stipple or pock the line into existence would fail. Yet, drawing from mark to mark has that any point so marked is only as a result of a generative process that each new point in the course of the line is immediately adjacent to: the previous point.

Incorrect. Even in Geometry, points on a line cannot be consecutive. Euclid's very first postulate prevents this: "Between any two distinct points a line can be drawn." This would not be possible if the points are adjacent; therefore, no two points can ever be adjacent in geometry.

> It was mentioned that the reason that rigor/soundness in analysis is a perceived requirement is for the differentialists, or analysts. Yet, consider, some of the most powerful tools of the analyst such as the impulse function (delta of Dirac), which has a value of infinity at zero yet zero elsewhere yet integrates over the domain evaluating to one, not a real function, and in the geometric context that the area under the point width at infinity equals one. That's much more directly reconcilable with the notion of the differential of the constant function, the sum of which over infinitely many points between zero and one equals the constant, than that instead those notions are not sound. Those tools are very regularly used.

The Dirac delta function is not a function of the Reals, since its value at 0 is infinite. It is a function of the Extended Reals, that is the reals plus an ideal point called "infinity", using the traditional lemniscate as its symbol. The Extended Reals (denoted Roo) are topologically equivalent to the circle, and has many nice properties, but some statements true in R become false in Roo and vice−versa. (For example, in R the functions e^x and 1/x are continuous and discontinuous respectively, but the reverse is true in Roo.) Moreover, some basic arithmetic niceties, such as R being closed over subtraction, fails in Roo.

Even within Roo, the Dirac delta function must be formally axiomitized since it is not provable from the axioms of Roo alone.

Regardless, I fail to see the point you are trying to make about this function. The existence (or non−existence) Dirac delta's axiomitization is completely irrelevant to the topology or cardinality of R.

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