Re: Ultimate debunking of Cantor's Theory

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- *From*: "Peter Webb" <webbfamily@xxxxxxxxxxxxxxxxxxxxxxxxxx>
- *Date*: Fri, 13 Jul 2007 16:03:22 +1000

"Calvin" <crice5@xxxxxxxxxxxxxx> wrote in message
news:1184302605.693984.81760@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

> On Jul 13, 12:27 am, Proginoskes <CCHeck...@xxxxxxxxx> wrote:
>
>> On Jul 12, 8:44 am, Calvin <cri...@xxxxxxxxxxxxxx> wrote:
>> > A variation of that which I subjectively like is making
>> > it a list of binary expansions instead of decimal. Then
>> > it is only necessary to 'flip' the diagonal, changing
>> > all ones to zeros and all zeros to ones.
>>
>> No, this doesn't work. In fact, it fails spectacularly:
>>
>> a(1) = .011111...
>> a(2) = .011111...
>> a(3) = .011111...
>> ...
>>
>> Your "new" binary decimal turns out to be .100000..., which is equal
>> to .01111...; so you don't get a new number after all!
>
> I have no idea what you are talking about.
> Your a(1), a(2), and a(3) above do not suggest
> a hypothetical list of the binary representations
> of the real numbers between 0 and 1, which is what
> I was talking about.
>
> I'll take a wild guess at what you mean. Maybe
> you are saying that there could be a hypothetical
> countable list of the reals between 0 and 1 such
> that for the nth element of the list (n>1), the binary
> expansion is .0 followed by all 1's out to the
> diagonal position, and whatever else beyond the
> diagonal position.
>
> But you can't make the list that way, because many
> (infinitely many, actually) of the reals between

> 0 and 1 would be missing from such a list.
>
> Similarly you couldn't make a list of the rational
> numbers between 0 and 1 that way. It's absurd.

What Prog said is quite true. He just picked an example which (whilst correct) is probably a little bit too clever.

He hasn't claimed that you can write down a list of all Reals in base 2. He claims that the Cantor diagonal argument cannot be used in base 2 to prove this.

Here is a somewhat clearer example.

Imagine the list is:

a(1) = 0.011111 ...
a(2) = 0.01
a(3) = 0.001
a(4) = 0.0001
..
..

Form the diagonal by flipping bits. You get

cantor diagonal = 0.1000000...

But 0.0111... is the same number 0.1 (unless you also believe that 0.999... <> 1), and so the Cantor diagonal does appear on the list.

Now we all know that the list above doesn't contain every Real, but the Cantor diagonal construction doesn't itself prove this to be true.

(His example was a "bit too clever" because he set a(2) = a(3) = a(4) ...., which is quite valid but obscures his central argument).

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