

Re: Cardinality of Real Numbers

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- *From:* "NotP" <spam@xxxxxxxx>
 - *Date:* Sun, 28 Aug 2005 17:59:25 GMT
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<jswimr3@xxxxxxxx> wrote in message
news:1125251641.615664.93900@xx

> I've been thinking about cardinality proofs lately, and I've run into
> something that's been bothering me. I thought of what seems like a
> mapping from the set of integers to the set of real numbers. Now, of
> course, this can't exist, so there must be something wrong with my
> mapping, but I can't see what it is.

>
> The mapping works like this: for each integer, map it onto all the
> reals you can get by putting a decimal point anywhere in it. For
> example, 123 would map to:

- >
- > 123
- > 12.3
- > 1.23
- > .123

>
> It seems like this would cover the full set of real numbers. Each of
> these mapped sets of reals is finite, and there would be a countable
> number of these sets, since the integers are countable. So this would
> seem to be a countable union of finite sets, which would, itself, be
> countable.

>
> I was wondering if perhaps I run into trouble with real numbers like
> .00000123, which wouldn't correspond to an integer in my scheme. But
> it seems like you could get around that by making a new rule, for
> example, that real numbers which begin with 1 would map to the numbers
> they would normally map to, but would also map to decimals where the 1
> is turned into a zero. So 10000123 would map to all the numbers it
> normally maps to, and would also map to .00000123. There would still
> be a finite number of real numbers for each integer.

>
> But the real numbers aren't countable. So where did I go wrong?

1. every number you "map to" is rational.
2. you do not even "map to" all of the rationals. (what about
..3333333333.... = 1/3?)

- **References:**

- ◆ **Cardinality of Real Numbers**

- ◇ From: jswimr3

- Prev by Date: **Re: Possible combinations**
- Next by Date: **Re: Rational and irrational numbers**
- Previous by thread: **Re: Cardinality of Real Numbers**
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