

Re: Cardinality of Real Numbers

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- *From:* "Proginoskes" <CHeckman@xxxxxxxxxx>
 - *Date:* 30 Aug 2005 00:02:39 -0700
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stephen@xxxxxxxxxx wrote:

> jswimr3@xxxxxxxxxx wrote:

>> 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.

>

> What about $1/3$? Or $\sqrt{2}$? All integers have a terminating
> decimal representation. Not all reals have a terminating decimal
> representation.

>

> <snip>

>

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

>

> By assuming that all reals have a terminating decimal
> representation.

This seems to be a common mistake made by people who claim that $[0,1)$
is countable.

--- Christopher Heckman

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Re: Cardinality of Real Numbers

• **References:**

◆ **Cardinality of Real Numbers**

◇ *From:* jswimr3

◆ **Re: Cardinality of Real Numbers**

◇ *From:* stephen

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