Re: Relative Cardinality

Source: http://sci.tech−archive.net/Archive/sci.math/2005−07/msg02539.html

- *From*: mueckenh@xxxxxxxxxxxxxxxxx

- *Date*: 17 Jul 2005 09:02:54 −0700

Proginoskes wrote:

> In order to even _talk_ about the notation 0.333..., you need to have
> the concept of limits and sums of an arbitrarily large number of
> numbers.

No problem with potential infinity. I can reproduce an abbreviation for a number larger than any one you tell me. Knuths arrow−notation or Steinhaus' squares are but one way to achieve that. I have a limit, namely there is always a (decadic) terminating rational fraction a such that I a − 1/3 I < eps for any eps > 0 which can be expressed.

> Since there are only a finite number of Muecken numbers, this
> means 0.333... is undefined in your system, so you are not allowed to
> use it.

No. Further there is the possibility to change to the 3−adic system where 1/3 = 0.1.

> What do you mean by "a simple rule"? Give me a concrete definition.

Consuming less information than 10^100 bits can store.

> Well, there goes set theory (which says, for one thing, that if S is a
> set with n elements, the set of all subsets of S has 2^n elements).

The power set of the set of all sets does not exist. A set of 10^100 elements is the set of all. It is a bit smaller than Cantor had expected but he knew already that not every collection is a consistent set.
>
> > 0.333... may have infinitely many digits 3.
>
> _How many_ digits? Infinity is not a number. (Not even in the standard
> set of real numbers.)
>
More than anyone can say. Potential infinity.

> > But the number of different numbers like 1/3 is less than 10^100.
>
> What do you mean by "numbers like 1/3"? (Your comment is unnecessary,
> since the number of Muecken numbers itself has at most 10^100 elements.
> Adding more conditions to the set only reduces the number of elements.)

We are in the comfortable situation that, contrary to oil, food, and
water, the bits have not yet become scarce.

>
> Then define it. If there's no definition, it's worthless from a
> mathematical point of view (and you may as well move your posts to
> alt.fan.numerology).

I have already defined: A natural number exists if there is a
fundamental set or if there is an n−adic representation realized.
>
> This is not true. You are confusing a property of the set with a
> property of its elements. The _set_ {Berlin, 23, Mars} is finite, but
> you'd (presumably) never say that the _element_ Berlin is finite.
>
> The _set_ {1, 2, 3, ...} in standard number theory is _infinite_, and
> its _elements_ are all _finite_.

That example does not fit the problem. N consists of elements which,
contrary to Berlin,
1) are ordered
2) count their initial segment.

>
> Infinite means, literally, not finite.

Yes. But not actually infinite. Actual infinity is a number (a whole
number according to Cantor).
Now draw the graph of a simple function f(n) = n where n represents the
natural numbers and f(n) the numbers {1,2,3,...,n}. This function is
the diagonal of the first quadrant of the Cartesian co−ordinate system.
As long as infinity is not actually reached by n it is not reached by
f(n) and vice versa.

>

> Knowing all the digits of the real numbers can be done with arithmetic
> (the standard long division algorithm, where you find the integer part
> of the first number, the integer part of the second number, and quit if
> they're not equal; otherwise, find the tenth digit of the first number
> and the tenth digit of the second number, and if they're not equal, you
> know which one is bigger; etc. If you have two different real numbers,
> this procedure will terminate). This means that real numbers, as

> defined in the standard real number system, exist.

But it need not terminate before your means of writing down the
integers is exhausted (including your personal memory).
>
> which means my point is valid; you do _not_ know all the digits
> 0.111... unless
> you allow arbitrarily large numbers to exist. (I've also warned you
> about the notation 0.111..., which in your number system is
> meaningless, haven't I? I think so.)

It is not meaningless. There are arbitrary many 1's. The limit is 1/9
because potential infinity is always sufficient for analysis.
>
> Okay, let's refine the question: You have a list of particles in the
> universe in some order. You show up "at work", with all the 1's on the
> particles, in the same order you've established. What number does the
> universe represent?

You show up at work in front of your screen. It is filled with 1's.
What number does the screen represent?

You need not write down all the 1's of the prime number 700 of the form
111...111. But it is sufficient to encode the information: All digits
are 1, the number of digits is 10^25. As i have written down here. Only
for numbers which do not follow any simple rule, like pi, we must write
down all the digits.
> There is actually a bit of regression here, once we talk about rules,
> because the rules have to be interpretted. (The particles that have
> 111...111 on them also include the particles that tell what the rules
> are.) So you will need to say how to interpret 111..111 (on the "rule"
> particles only) first.

That is not a particular problem of mine. It is the same with
mainstream mathematics.
>
> All of this boils down to the following: There has to be some rule
> which is not written down. This rule should give you a unique
> interpretation for every possible representation, which may be simple
> or complicated, but you still end up with only 10^100 Muecken numbers.
>
> If the unwritten (literally 8−)) rule changes, the numbers you get can
> change, but how do you know which unwritten rule to use, unless it's
> written down on some particle? And once again we find that the number
> that the universe represents depends on some rule about rules (which
> rule do we use?) and what's written on particle X, which may as well
> have been stated as an unwritten rule in the first place.

That is all the same with any representation of numbers.

> How do you know consciousness in physically inside my head? Maybe it

> "leaks in" from some hyperspace. (This is an unsettled problem
> discussed by philosophers for centures, so I don't really expect an
> answer. 8−))

If you are a convinced solipsist you should never attend meetings.
>
>
> Geometry works with what are called "ideal objects": lines that have no
> width, points that have no dimension, etc. These objects do not exist
> in the physical world, so mathematics cannot be a part of physics.

Reality supplies the stuff. A bit of abstraction is fine. But I am
sure, there is no ideal circle or rectangle in your head.
>
>
> Yes, they can; I can perform an algorithm to find any digit of sqrt(2)
> in finite time.

Then try to find out and store th firt 10^100 digits.
>

> It is one possible measure for sets. Your "cardinality" is similar, in
> that it is one possible measure for sets as well. However, you should
> not have said that your "cardinality" is the same as traditional
> cardinality, unless you can show that, for any set S, the cardinality
> of S is the same as the "cardinality" of S. Only then would you have
> had the right to say your "cardinality" is the well−established
> cardinality.

Cardinality was introduced as a measure of the number of elements. And
when introducing it, Cantor mentioned something like clar thought. That
is also the foundation of my definition.
>
> In an example which is probably clearer, I could decide to start
> calling an apple a banana. There's nothing wrong with this, until I
> start talking with other people about fruit. There, my statements that
> "some bananas are red" and "bananas are nearly round" make no sense,
> even though they are perfectly okay from my point of view. This
> confusion results from using standard terminology in a non−standard
> way.
>
> > Cantor defined it by "our thinking".
> > He then used bijections to measure it but did not explain why.
>
> That's the _definition_ of standard cardinality. It's just like saying
> that 3 is an abbreviation for 1 + 1 + 1. Why is "3" defined this way?
> You tell me, and you'll understand why Cantor used bijections.

I have proved tha there are not more irrational numbers than rational
numbers.

>
> Which in particular don't exist? In particular, what is the smallest
> value of N such that 1, 2, 3, ..., N are numbers, but N+1 isn't?

How far does our atmosphere stretch out into the space? Please answer
in millimeters.
>
> > > When real numbers were defined (based on sequences of rational
> > > numbers), great care was taken to show when two of these resulting real
> > > numbers are the same and when they are different.
> >
> > In order to define pi by a sequence there is the necessity to show that
> >
> > | a_n − pi | < epsilon
> > for any positive epsilon.
>
> (You've mixed up quantifiers here. Pi can be defined by a sequence of
> rational numbers a_n, but the condition on this sequence is that for
> every positive epsilon, THERE EXISTS AN N such that |a_n − pi| <
> epsilon when n >= N. The value of N changes when epsilon changes; you
> do not need to have |a_n − pi| < epsilon for all n and for all epsilon.

You misunderstood me. Perhaps my fault. It must be possible to satisfy
this inequality for arbitrarily small epsilon. But already for the
comparatively large eps = 1/10^10^100 this inequality cannot be
satisfied by any a_n.

Regards, WM

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- ***Follow−Ups***:
  - ***Re: Relative Cardinality***
    - *From:* Proginoskes
  - ***Re: Relative Cardinality***
    - *From:* Virgil
  - ***Re: Relative Cardinality***
    - *From:* Randy Poe

- ***References***:
  - ***Re: Relative Cardinality***
    - *From:* mueckenh
  - ***Re: Relative Cardinality***
    - *From:* Virgil
  - ***Re: Relative Cardinality***
    - *From:* mueckenh
  - ***Re: Relative Cardinality***
    - *From:* Dik T. Winter
  - ***Re: Relative Cardinality***

- ◊ *From:* mueckenh
- ♦ ***Re: Relative Cardinality***
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  - ◊ *From:* mueckenh
- ♦ ***Re: Relative Cardinality***
  - ◊ *From:* Proginoskes

- Prev by Date: ***Re: Steven Cullinane is a Crank***
- Next by Date: ***Re: polynomial for 2^(1/3)−i***
- Previous by thread: ***Re: Relative Cardinality***
- Next by thread: ***Re: Relative Cardinality***
- Index(es):
  - ♦ ***Date***
  - ♦ ***Thread***