Re: Multiple infinities − one more look

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- *From*: "Ross A. Finlayson" <raf@xxxxxxxxxxxxxxx>
- *Date*: Fri, 7 Dec 2007 22:58:18 −0800 (PST)

On Dec 7, 9:59 pm, Venkat Reddy <vred...@xxxxxxxxx> wrote:

> On Dec 8, 8:33 am, "Mike Terry"
>
> <news.dead.person.sto...@xxxxxxxxxxxxxxxxxxx> wrote:
>
>> "Venkat Reddy" <vred...@xxxxxxxxx> wrote in message
>>
>> news:052a8b26−92db−46a9−8caf−1ba9c7300927@xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
>>
>>> I see. I think order is related to how you choose to represent
>>> the
>>> number. If the real number is represented by a digit sequence
>>> of
>>> infinite length, we immediately have an order for all reals,
>>> since
>>> digit position have an order. For example, for the length of 6
>>> digits,
>>> one can generate these sequences by writing all possible
>>> permutations
>>> and combinations of digit sequences in an orderly fashion.
>>> This can be
>>> continued for lager length of digit sequences without limit.
>>> All
>>> possible digit sequences are guaranteed to appear somewhere
>>> in the
>>> list.
>>
>> No. This process only generates finite digit sequences. Real numbers have
>> infinite digit sequences...

> > Instead, if you choose to represent a real number by an
> > algebraic
> > equation, here also we have an order in representing the
> > equation
> > itself, so the resulting reals have an order. Likewise for
> > transcendental as well − once you have a way of identifying
> > the
> > number, we have a way of ordering them.

> It seems you are thinking of something like "computable numbers", and these are indeed countable. Real numbers need not be computable in this sense (i.e. having a finite program to output their digits in sequence).

> > You may say you want to represent the real number as a
> > point on the
> > line such as the interval [0,1]. Here also we have an order.
> > Cut the
> > line into half and mark the 0.5 as your first real number. Cut
> > the two
> > pieces in to two equal parts, mark 0.25 and 0.75 as new real
> > numbers.
> > Continue the process for ever and you have an ordering of all
> > points.

> No. Real numbers need not be one of these points you construct, although your process will construct real numbers arbitrarily close to any given real number.

Let's identify a real number as a unique label for a cut in a line segment (spatial continuum) at a random location. The fact is, such cuts or splits or points exist only after you imagine them. The continuum doesn't already have them ready for us to count. This is similar to fact that we also do not have "ones" ready to count as natural numbers, but only after you imagine some discrete items.

The natural ordering of such cuts, is exactly similar and opposite to ordering of natural numbers. Natural number sequence keeps introducing a new "one" in an attempt to fill the "empty continuum". A reciprocal process for this would be to introduce a new "zero" or split in an attempt to empty the "full continuum". However, introducing the splits wouldn't be by adding one at a time, but 2^n of those at a time. This follows from the observation that in natural number sequence we are

adding a "one" to every "empty continuum", and hence we need to add a
split to every "full continuum", that is, the pieces resulting from
the previous cuts.

This ensures that we can always imagine 2^n number of splits for every
imaginable natural number n. When the natural number hits infinity,
then we have 2^oo as the number of points, all are perfectly ordered
or sequenced.

− venkat

> One might be quick to point that this process can only hit the
> real
> numbers of the form of multiples of 1/(2^n), and misses the
> numbers
> like 1/3, 1/pi, 1/sqrt(2). My answer for this is, have a
> representation of these numbers as points on the real line and
> show me
> why my process can't hit these points, if you really continue
> the
> process for ever.

> Better yet, have a list of all possible representations − digit
> sequences, algebraic equations, geometric models etc. For
> each of
> these representations, have a process to generate all possible
> numbers
> in that representation as I have shown above. That should
> cover all
> real numbers in an orderly fashion, though in a
> 2−dimensional order.

Well, you've given 3 suggestions above, and all 3 suggestions are wrong and
putting them together doesn't make things any better! :−)

> Ask for any number, one of these processes is guaranteed to
> have it in
> its list (I would even say every process have that number in
> its list,
> but at different positions, but I don't need to depend on this
> anyway).

Also, since each of these processes have a countable list, and
the
number of processes is also countable, the reals must be
countable.
Did I miss anything?

Each of your processes covers only a proper subset of the real numbers.

Regards,
Mike.

− venkat− Hide quoted text −

− Show quoted text −

In reference to something along the lines of 1, 3, 5, ..., then 2, 4, 6, ... A notion about mapping that to a sequence is to map 1 to 1, 3 to 2, 5 to 3, etcetera, in the order of the natural integer sequence, then there is a question about all of those values as constants being used already. Then, with some notion of a transfinite sequence, then there is a consideration of "omega+1, omega+2", etcetera. So, consider omega a constant of sorts, yet all the previous constants are used already. So, omega is some infinitary constant (label), where each of the first half of the sequence have leading zeros, each of the second half of the sequence has a leading nonzero constant, an infinitarily unique constant. Then, the alphabet of values is infinitary, to well−order the integers in a manner thus that there are infinitely many elements less than a particular element. Then, in an infinite base, that is to say where there are infinitely many constants, similarly to base one, base two, and base three, the antidiagonal argument doesn't apply, instead simply confirming the successor.

For any finite list of constants in successive order, the antidiagonal is the succesor, and order type, and in ubiquitous ordinals, powerset. (That's again with the notion of successor ordinals formed that are simply the powerset, the succesor ordinal's mechanistic form is the powerset.)

That three space dimensions are particularly concise is not obviously related, yet some people can find a physical parallel to any mathematical statement. (V = L).

Infinite sets are equivalent. That is so in a theory where all infinite sets are axiomatized as irregular, in moreso that the are their own rootsets and powersets.

The powerset has lots use in terms of counting things in the finite and small. The value 2^n appears in many forms. That's where 2^n appears in many composite forms. That's how many elements are in the powerset of the n−set, with size n: 2^n. It might seem interesting to make tables and then sum the rows of various counts and then assign them to geometrical figures. Anyways a wide variety of other numbers are very useful in terms of the cardinalities of combinatorics of finite sets. (I pronounce finite fi−nit, with no emphasis, not fi−night, as well, infinite in−fi−nit.) Consider for example n!, n factorial, which is the product 1 through n. That's the number of ways n things can be put in an order, a permutation, that's how many transitive orders there are of those things. Then using two variables, the count n of objects and subset's count k of objects, there are such useful notions as the choice: function, n choose k, subset function: x subset number k, and cycle function: n cycle number k, also know as the binomial coefficients and Stirling cycle and subset numbers, Stirling numbers of the variously first and second kind.

n!: count of permutations of an n−set
s(n,m): count of permutations of an n−set containing m−many permutation "cycles",

In Knuth's notation for n cycle k the binomial coefficients is the stacked numbers in the parentheses, and n cycle k is the stacked numbers in the square brackets.

http://mathworld.wolfram.com/StirlingNumberoftheFirstKind.html (cycle number)

A nice thing about them is that they can be computed in many ways.

I wonder how many there are of various partial permutation cycles, in that there aren't complete transitive cycles. Maybe I should investigate that for more than a minute, not the associated Stirling numbers.

The Stirling subset number, which is the count of partitions of an n−set into m−many disjoint subsets, is written in the Knuth notation the stacked elements in the curly parentheses. Consider for example pigeonhole problems, where there are n objects and m cubbyholes, how many ways there are to put a given number of objects into bins so none of the bins is empty. That's exactly n subset m. Then, there are more ways than that to put a given number of objects into bins, with possible some of the bins being empty. Knowing these exact values is very useful in formulating counting arguments so that then probabilities are easy to determine, about what happens when a set of objects is randomly distributed to separate bins.

http://links.jstor.org/sici?sici=0002−9890(199410)101%3A8%3C771%3AATNON%3E2.0.CO%3B2−U

I could easily go on about the tremendous utility of counting arguments of finite combinatorics. It would really be a reasonable thing to do to define the counts of the objects of n−sets and generally multi−sets, or vice versa, as expressions of primary interest and concise notation in definitions of convenient terms. The point is that in the consideration of algorithms that would expect to be useful on finite sets, they often are in the application to systems modeled by iteratively larger finite sets, infinite sets.

To be putting the points on a line, put them in a line.

Ross

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