Re: An infinite debate

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- *From*: "Ajeet" <asgrewal@xxxxxxxxx>
- *Date*: 7 Nov 2006 08:21:48 −0800

Randy Poe wrote:

> Ajeet wrote:
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> > Tim Peters wrote:
> >
> > > [Ajeet]
> > >
> > > > Hi All,
> > > >
> > > > Consider the following set :
> > > >
> > > > S = U S_i (0<=i<infinity and U denotes the
> > > > set operation of union)
> > > >
> > > > where S_i is the set of all numbers, whose
> > > > decimal representations are
> > > > of length i. For example the number 3.4
> > > > belongs to S_2. (assume the
> > > > decimal does not add to the length, so 34
> > > > would also belong to S_2).
> > >
> > > Then this consequence follows:
> > >
> > > If r is an element of S, r's decimal representation is finite.
> > >
> > > Simply because there must be an i such that r is an element
> > > of S_i, in which
> > > case r's decimal representation has i digits.
> > >
> > > > Argument : S = R (set of all real numbers)
> > > > ========
> > >
> > > Good luck ;−)

Proof:
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Suppose a real number "r" does not exist in
S. let the decimal
representation of "r" be
d_0.d_1d_2d_3......(to infinity) where d_i is
the ith digit.
+Since r does not belong to S, there will be
some digit k which will be
off.

Why? This effectively assumes what you're trying to prove.
What /does/
follow is that r's decimal representation is not finite.

More precisely

the prefix d_0.d_1d_2d_3....d_k−1 belongs
to S but,
the prefix d_0.d_1d_2d_3....d_k−1d_k does
not belong to S

But this is not possible because that prefix
would have been added in
all sets S_j where j >= k+1.

Whereas what actually obtains is that every finite prefix of r
is contained
in S. The idea that there must be some k such that r's first k
digits
appear in S while r's first k+1 digits don't is simply false.

Yes ... I have been given this argument. I understand it but dont get the premise. For example, you will probably argue that the set of all finite strings will not conta