

Re: 1-1/2+1/3-1/4+1/5-1/6+1/7

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- *From:* "Jesse F. Hughes" <jesse@xxxxxxxxxxxxxxxx>
- *Date:* Mon, 11 Feb 2008 09:13:50 -0500

Han de Bruijn <Han.deBruijn@xxxxxxxxxxxxxxxx> writes:

Jesse F. Hughes wrote:

$S[x] = \{ S(z) \mid z \text{ in } x \}$
 $= \{ y \mid (\exists z \text{ in } x)(\exists n \text{ in } \mathbb{N})(\exists m \text{ in } \mathbb{N})(m > n \rightarrow y \text{ in } S_m(z)) \}$
 I do not see why that should be the same set as
 $T(x) = \{ y \mid (\exists n \text{ in } \mathbb{N})(\exists m \text{ in } \mathbb{N})(m > n \rightarrow (\exists z \text{ in } x)(y \text{ in } S_m(z))) \}$
 So, you have to show that $(\exists z \text{ in } x)(\exists n \text{ in } \mathbb{N})(\exists m \text{ in } \mathbb{N})(m > n$
 $\rightarrow y \text{ in } S_m(z))$ iff $(\exists n \text{ in } \mathbb{N})(\exists m \text{ in } \mathbb{N})(m$

$n \rightarrow (\exists z \text{ in } x)(y \text{ in } S_m(z)))$

I don't believe it's so.

In the lucid notation by G. Frege:

$\lim_{n \rightarrow \infty} S_n[\mathbb{N}] = \{\mathbb{N}\}$. Hence $S[\mathbb{N}] = \{\mathbb{N}\}$. But also:

How do you figure that? The claim $\lim_{n \rightarrow \infty} S_n[\mathbb{N}] = \{\mathbb{N}\}$ comes from nowhere, as does the claim that $S[\mathbb{N}] = \lim_{n \rightarrow \infty} S_n[\mathbb{N}]$.

Again, if we chase through the definitions, we find:

$S[x] = \{ S(z) \mid z \text{ in } x \}$
 $= \{ y \mid (\exists z \text{ in } x)(\exists n \text{ in } \mathbb{N})(\exists m \text{ in } \mathbb{N})(m > n \rightarrow y \text{ in } S_m(z)) \}$

$\lim_{n \rightarrow \infty} S_n[x] = \{ y \mid (\exists n \text{ in } \mathbb{N})(\exists m \text{ in } \mathbb{N})(m > n \rightarrow (\exists z \text{ in } x)(y \text{ in } S_m(z))) \}$

(Of course, $T(x)$ was just a silly way of writing $\lim_{n \rightarrow \infty} S_n[x]$ so let's use G. Frege's notation.)

Thus, if you want to show that these two sets are equal, you need to

show that

$$(\exists z \text{ in } x)(\exists n \text{ in } \mathbb{N})(\forall m \text{ in } \mathbb{N})(m > n \rightarrow y \text{ in } S_m(z))$$

iff

$$(\exists n \text{ in } \mathbb{N})(\forall m \text{ in } \mathbb{N})(m > n \rightarrow (\exists z \text{ in } x)(y = S_m(z)))$$

at least in the special case when $x = \mathbb{N}$.

$$\lim_{n \rightarrow \infty} S_n[\mathbb{N}] = \lim_{n \rightarrow \infty} \mathbb{N} \setminus \{0, 1, 2, 3 \dots, n\} = \mathbb{N} \setminus \lim_{n \rightarrow \infty} \{0, 1, 2, 3 \dots, n\} = \mathbb{N} \setminus \mathbb{N}$$

Right.

Hence: $S[\mathbb{N}] = \{\}$. No ?

No.

Is there a problem while interchanging a set difference with our limit ?

Not sure what set difference you're talking about. The problem is that you think $S[\mathbb{N}] = \lim S_n[\mathbb{N}]$, but if you unravel the definitions you'll see that this just isn't so.

Here is another reason that the bracket notation isn't so good. It's true that

$$S(x) = \lim S_n(x)$$

but it is not true that

$$S[\mathbb{N}] = \lim S_n[\mathbb{N}].$$

In terms of that more categorical notation, we'd say something like: $S = \lim S_n$, but not $PS = \lim PS_n$, i.e., that the powerset functor doesn't commute with colimits. Something like that, anyway, but not *quite* that, since s isn't really a function in the category Set. But since category theory probably won't clear up your issues, let's leave the details alone.

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"[I want to] stand at the pinnacle of human achievement with no one else in all of history even close, no human being having faced what I have—and survived. Because when all is said and done, make no mistake, the simple truth is, I am better." —James S. Harris

Re: $1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \frac{1}{7}$