103 Are the binary expressions

$$nil \rightarrow x \;=\; x$$

$$(S;T) \rightarrow x \;=\; S \rightarrow T \rightarrow x$$

(a) consistent with the theory in Chapters 2 and 3?

(b) theorems according to the theory in Chapters 2 and 3?

After trying the question, scroll down to the solution.

§ According to Chapter 2, $nil{\rightarrow}x \mid L = x$. Together with $nil{\rightarrow}x = x$, that means we would have $x \mid L = x$. Letting x be a list, we can easily turn this into a contradiction. There is a similar clash between $(S;T) \rightarrow x \mid L = S{\rightarrow}(T{\rightarrow}x \mid L@\mathrm{S}) \mid L$ from Chapter 2 and $(S;T) \rightarrow x = S{\rightarrow}T{\rightarrow}x$. Too bad. It would be nice to have these elegant axioms and extend arguments to strings.

§ I think the theory in Chapters 2 and 3 is consistent, so I think these binary expressions cannot be theorems.