CS313K: Logic, Sets, and Functions

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Lecture 13 – Chap 4 (4.6, 4.7, 4.8)

Announcement

I will add 10 points (out of 100) to your Midterm 1 grades.

Any student who made more than 90 on Midterm 1 will have the "spillover" points credited to Midterm 2. Thus, if you made 100 on Midterm 1, you will start Midterm 2 with 10 extra points.

If I curve Midterm 2, the spillover will go to the Final.

T1: (rev (app x y)) = (app (rev y) (rev x))

T2: (true-listp (app x y)) $\leftrightarrow$ (true-listp y)

T3: (true-listp x) $\longrightarrow$ (rev (rev x)) = x

In some of your classes, professors will say something like: "'"Let S be the set of all sequences. If x and y are sequences then $x \diamond y$ denotes the concatenation of x followed by y, and $\overline{x}$ denotes the reverse of x."

Implicitly, a sequence is a `true-listp`; "$x \in S$" means "x is an element of the set S" or "`(true-listp` x`)`."

T1: $\overline{x \diamond y} = \overline{y} \diamond \overline{x}$.

T2: $(x \diamond y) \in S \leftrightarrow (y \in S)$

T3: $x \in S \rightarrow \overline{\overline{x}} = x$

However it is written, you should understand the logical meaning of these sentences to be:

T1: (rev (app x y)) = (app (rev y) (rev x))

T2: (true-listp (app x y)) $\leftrightarrow$ (true-listp y)

T3: (true-listp x) $\longrightarrow$ (rev (rev x)) = x

About a Quiz 3/2 Question

In class on Tuesday I asked whether

Theorem:
`(f (g x nil)) = (f x)`

could be used to rewrite

((p a) $\wedge$ (q b)) $\longrightarrow$ (p $\underline{\texttt{(f (g a b))}}$)

at the underlined place.

About a Quiz Question

This question could have been phrased: Can

Theorem:

`(f (g x nil)) = (f x)`

be factored so that the pattern matches the underlined term below?

$$((\texttt{p a}) \wedge (\texttt{q b})) \longrightarrow (\texttt{p } \underline{(\texttt{f (g a b)})})$$

Note that if you chose the pattern to be

Theorem:
`(f (g x nil)) = (f x)`

then it will not match `(f (g a b))`.

Reason: There is no σ such that `(f (g x nil))`$/\sigma$ $=$ `(f (g a b))`.

About the Rewrite Rule of Inference

In class today, we spent most of our time disecting the Rewrite Rule of Inference.

The examples I worked in class are not in the book.

But similar examples are in Sections 4.6.1 (pg 121) and 4.6.3 (page 126).

But Remember...

I want you to be able to use previously proved theorems to rewrite (simplify) new conjectures. I want you to be able to do that without making logical mistakes!

But I don't care if you can say what is "π", what is "ψ_h", "$(\psi_h \to (\phi_h/\sigma))$", etc.

Just learn how to do it right and you'll be fine.