CS313K: Logic, Sets, and Functions

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(Lecture 8)
Announcements

Everybody got a 10 on Tuesday’s quiz.

In homeworks you can always call other functions that you’ve defined.
Clue to Question 98

(mutual-recursion
(undef vars-in-wff (x)
  (cond ((is-var x) _____)
        ((is-const x) _____)
        (t (_____ (vars-in-wff-args (cdr x)) _____))))
(defun vars-in-wff-args (args)
  (if (endp args)
      ___
      (___
       (vars-in-wff (car args))
       (vars-in-wff-args (cdr args)))
  ))
Your Questions
My Questions

(Deleted)
Example Proof

(defun app (x y)
  (if (consp x)
      (cons (car x)
        (app (cdr x) y))
      Y))

Theorem:
(cdr (app a b))
=
(if (consp a)
  (app (cdr a) b)
  (cdr b))
Proof:
(cdr (app a b))
= ; by def of app
(cdr (if (consp a)
     (cons (car a)
         (app (cdr a) b))
     b))
= ; by cdr-if rule
(if (consp a)
     (cdr (cons (car a)
\[(\text{app } (\text{cdr } a) \ b))\]
\[
(\text{cdr } b)\]
\[
= \quad ; \text{by cdr-cons rule}
\]
\[
(\text{if } (\text{consp } a)
\quad (\text{app } (\text{cdr } a) \ b)
\quad (\text{cdr } b))
\]

\text{q.e.d.}
The way I type these proofs is that I copy the last line I wrote, write an “=” sign, paste down the copy, edit it to make the transformation I want, and then write the explanation between them. Then repeat.

So for example, when the last line was:
(cdr (if (consp a)
    (cons (car a)
        (app (cdr a) b))
    b))

The sequence was this:
(cdr (if (consp a)
    (cons (car a)
      (app (cdr a) b))
    b))
(cdr (if (consp a)
    (cons (car a)
        (app (cdr a) b))
    b))

= 

(cdr (if (consp a)
    (cons (car a)
        (app (cdr a) b))
    b))
(cdr (if (consp a)
    (cons (car a)
        (app (cdr a) b))
    b))

=

(if (consp a)
    (cdr (cons (car a)
        (app (cdr a) b)))
    (cdr b))