

CS313K: Logic, Sets, and Functions

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(Lecture 14)

Announcement

Everybody present got a 10 on Quiz 3/5.

I changed Homework 8! I made it easier.

Q183a: $(\text{consp } x) \rightarrow (\text{endp } x) = \text{nil}$

Q183b: $\neg (\text{consp } x) \rightarrow (\text{endp } x) = \text{t}$

Q188a: $(\text{consp } x)$

\rightarrow

$(\text{app } x \ y)$

$=$

$(\text{cons } (\text{car } x) (\text{app } (\text{cdr } x) \ y))$

Lemmas are like methods (!). They allow you to avoid doing the same work repeatedly.

In your homework, use lemmas! Don't just grind out the same sequence of steps over and over again.

Proof Advice

“Promote and Forward Chain!”

$((A \rightarrow (B \wedge C))$

\wedge

$(B \rightarrow D)$

\wedge

$(C \rightarrow E))$

\rightarrow

$(A \rightarrow (D \wedge E))$

Writing Down Cases

Suppose you want to prove γ using a case split justified by $\alpha \vee \beta$.

Case 1: $(\alpha \rightarrow \gamma)$

...

Case 2: $(\beta \rightarrow \gamma)$

...

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Suppose you want to prove γ using a case split justified by $\alpha \vee \beta$.

Case 1:

$$(\alpha \rightarrow \gamma)$$

$$\Leftrightarrow (\alpha \rightarrow \gamma')$$

$$\Leftrightarrow (\alpha \rightarrow \gamma'')$$

...

$$\Leftrightarrow (\alpha \rightarrow t)$$

$$\Leftrightarrow t$$

Case 2: ...

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Suppose you want to prove γ using a case split justified by $\alpha \vee \beta$.

Case 1: α

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$\Leftrightarrow \gamma'$

$\Leftrightarrow \gamma''$

...

$\Leftrightarrow t$

Case 2: ...

Writing Down Cases

Suppose you want to prove γ using a case split justified by $\alpha \vee \beta$.

Case 1: α (*Remember: α is a hypothesis!*)

γ

$\leftrightarrow \gamma'$

$\leftrightarrow \gamma''$

...

$\leftrightarrow t$

Case 2: ...