

Attempt 1

2. Give a proof of theorem L32. Hint: Be careful with the order that you deal with the quantifiers.

L32? K32 $(\forall x A(x) \wedge \exists x B(x)) \vdash \exists x (A(x) \wedge B(x))$

- ① $(\forall x A(x) \wedge \exists x B(x))$ ① Given
- ② $\neg(\forall x A(x) \rightarrow \exists x \neg B(x))$ ② $A \wedge B$ abbreviates
- ③ $\neg(\forall x A(x) \rightarrow \neg B(c))$ ③ Remove $\exists x$ shortcut
- ④ $\neg(A(c) \rightarrow \neg B(c))$ ④ Remove $\forall x$ shortcut
- ⑤

L15?

L16?

• unsure if I did this much right. Not sure how to deal with $(\forall x A(x) \wedge \exists x B(x))$ use L19 & L20 to get simplify

Also having a difficult time trying to write a proof to give me $A(x) \wedge B(x)$

* Should I even deal with the quantifiers first thing? Not in this case.

Attempt 2

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|--|---|-------------------------------|
| A | B | |
| ① $\forall x A(x) \wedge \exists x B(x)$ | | ① Given |
| ② $\forall x A(x) \wedge B(c)$ | | ② Remove $\exists x$ Shortcut |
| ③ $A(c) \wedge B(c)$ | | ③ Remove $\forall x$ Shortcut |
| ④ $\exists x (A(x) \wedge B(x))$ | | ④ Add $\exists x$ Shortcut? |

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|----------------------------------|-------------------------------|
| ② $\forall x A(x)$ | ② L19, line 1 |
| ③ $\exists x B(x)$ | ③ L20, line 1 |
| ④ $B(c)$ | ④ Remove $\exists x$ Shortcut |
| ⑤ $A(c)$ | ⑤ Remove $\forall x$ Shortcut |
| ⑥ $A(c) \wedge B(c)$ | ⑥ L18 lines 4-5 |
| ⑦ $\exists x (A(x) \wedge B(x))$ | ⑦ Add $\exists x$ |

Necessary