

Check Your Proof:

Proof: challenge problem #02

Construct a proof for the argument: $Ex(Gx \wedge \neg Kx)$, $Ax((Fx \vee Hx) \wedge \neg(Fx \wedge Hx))$, $Ax(Fx \rightarrow Kx) \therefore \exists x(Hx \wedge \neg Kx)$

1	$\exists x(Gx \wedge \neg Kx)$	
2	$\forall x[(Fx \vee Hx) \wedge \neg(Fx \wedge Hx)]$	
3	$\forall x(Fx \rightarrow Kx)$	
4	$Ga \wedge \neg Ka$	
5	Ga	Simplification 4
6	$\neg Ka$	Simplification 4
7	$Fa \rightarrow Ka$	Universal instantiation 3
8	$\neg Fa$	Modus Tollens 7, 6
9	$(Fa \vee Ha) \wedge \neg(Fa \wedge Ha)$	Universal instantiation 2
10	$Fa \vee Ha$	Simplification 9
11	Ha	Modus Tollendo Ponens 10, 8
12	$Ha \wedge \neg Ka$	Adjunction 11, 6
13	$\exists x(Hx \wedge \neg Kx)$	Existential generalization 12
14	$\exists x(Hx \wedge \neg Kx)$	Existential instantiation 1, 4-13

 new line  new subproof

 Congratulations! This proof is correct.

 check proof  start over

 Clear & Start a new Proof

Function 1 outputs FALSE:

$Ex(Gx \wedge \neg Kx)$

Function 2 outputs TRUE:

$Ax((Fx \vee Hx) \wedge \neg(Fx \wedge Hx))$

Function 3 outputs TRUE:

$Ax(Fx \rightarrow Kx)$

Conclusion:

$Ex(Hx \wedge \neg Kx)$

I understood the first function as saying that not every logged-in user accepted the terms, because the function returned false. So there must be at least one user who is logged in and has not accepted the terms. That is why I translated it as $Ex(Gx \wedge \neg Kx)$.

The second function returned true, so every user is either an admin or a standard user, but not both. I translated that as $Ax((Fx \vee Hx) \wedge \neg(Fx \wedge Hx))$.

The third function also returned true, which means that all admin users accepted the terms. So I translated it as $\forall x (Fx \rightarrow Kx)$.

For the proof, I started with the user from the first statement and called that user a . Since that user has not accepted the terms, I know $\neg Ka$. From the third statement, if a were an admin, then a would have accepted the terms. But a did not accept them, so a is not an admin. Then, from the second statement, every user is either an admin or standard. Since a is not an admin, a must be a standard user. So a is standard and has not accepted the terms. Therefore, there exists a standard user who has not accepted the terms and conditions.