L4F Workshop 4 (week 6)

L4F for Checking Semantic Tableau

This part is supposed to take approximately 15 minutes.

This is less of an exercise and more of an explanation on how you can use L4F to support you to check your Semantic Tableaux proofs. Hopefully that also helps you better understand what Semantic Tableau does! Semantic Tableau takes a set of formulae and either tells you whether there's no interpretation that makes them all true (though that is not always possible, any reasoner might just go on forever!), or it presents you such an interpretation. But that's exactly what L4F does! That means that you can check any of your branches for correctness!

Take our example 2 from week 6 (slide 26): $\exists x\, Fx, \exists x\, Gx \vdash^? \exists x\, (Fx \wedge Gx)$

Now type into L4F:

Sorts:	*Vocabulary:*	*Constraints:*
`entity.`	`predicate F(entity).`	`TRUE = SOME x F(x).`
	`predicate G(entity).`	`TRUE = SOME x G(x).`
		`FALSE = (SOME x (F(x) AND G(x))).`

We use these TRUE/FALSE lables only to emphasize the approach of Semantic Tableau, but you could also just do it without these lables by putting a NOT in front of the last formula.

Discuss in class:
1. Check out the output – and discuss/interpret it!
2. In the lecture it was stated that "in some worlds" (i.e., for some interpretations) the sequent might be valid, specifically if there's just one object. So, after you discussed the previous question, change the sorts entry from "`entity.`" to "`entity enum: a.`" or to "`entity enum: a, b.`" and discuss!
3. Finally, discuss how that helps you to check whether any single branch you might have constructed can be verified.

One final comment: Note that in Propositional Logic L4F can output *all* interpretations (if the number of solutions is set accordingly), but for Predicate Logic that's not necessarily the case. L4F does some isomorphism tests and therefore merges some equivalent solutions.

Puzzle: Parking Bay

In the remaining 45 minutes, try to solve the puzzle *Parking Bay* (number 8 of *Intermediate*) in groups of three. Use the last 5 to 10 minutes to discuss solutions/questions in the big group.