

CS81 Assignment 5
Due Tuesday, 23 February 2010

In 1-7, check each syllogism or sequent for validity by the tableau method. If not valid, give a counterexample. Assume that “a lover” means a person who loves someone.

1. Given
 - a. Everyone loves a lover.
 - b. Mary loves herself.It follows that
 - c. John loves Mary.

2. Given
 - a. Everyone loves a lover.
 - b. Mary loves John.It follows that
 - c. John loves Mary.

3. Given
 - a. Everyone loves a lover.
 - b. Mary loves herself.It follows that
 - c. Mary loves John.

4. Given
 - a. John loves everyone who does not love him/herself (and possibly others).It follows that
 - b. John loves himself.

5. $((\forall x A(x)) \rightarrow (\exists x B(x))) \rightarrow (\forall x (A(x) \rightarrow B(x)))$

6. $((\forall x A(x)) \rightarrow (\exists x B(x))) \mid \text{---} (\exists x (A(x) \rightarrow B(x)))$

7. $(\exists x (A(x) \rightarrow B(x))) \mid \text{---} ((\forall x A(x)) \rightarrow (\exists x B(x)))$

In 8-10, prove by the Sequent Calculus, or give a counterexample.

8. $(\forall x (A(x) \rightarrow B(x))) \mid \text{---} ((\forall x A(x)) \rightarrow (\exists x B(x)))$

9. $(\exists x (A(x) \rightarrow B(x))) \mid \text{---} ((\forall x A(x)) \rightarrow (\exists x B(x)))$

10. $(\forall x A(x)) \rightarrow \exists x B(x) \mid \text{---} \exists x (A(x) \rightarrow B(x))$