PHIL 220: Introduction to Logic

Week 12 Discussion (11/14/2025)

Translation

(#3) France borders only European countries.

(#8) Anyone louder than every soprano is a tenor.

(#10) The Rose Bowl is neither close to USC nor close to any stadium at which USC plays.

Models

Invalidity

(#28). $\exists x \exists y Rxy, \forall x \forall y (Rxy \rightarrow Ryx), \forall x \forall y \forall z ((Rxy \wedge Ryz) \rightarrow Rxz) \vdash \forall x \forall y Rxy$

(#22). $\neg \forall x (Px \rightarrow Qx), \forall x (Qx \rightarrow Px) \vdash \exists x (\neg Px \wedge \neg Qx)$

(#25). $\forall x \exists y \exists z (Pz \wedge Rxzy), Rabc \vdash (Racb \wedge \neg Pb)$

(#27). $\forall x \neg Rxx, \forall x \forall y \forall z ((Rxy \wedge Ryz) \rightarrow Rxz) \vdash \forall x \forall y \neg Rxy$

Extra:

1. $\forall x \exists y Rxy, \forall x \forall y (Rxy \rightarrow Ryx) \vdash \forall x \forall y (Rxy \vee Ryx)$

2. $\exists x (Px \wedge Qx), \forall x \forall y ((Px \wedge Qy) \rightarrow Rxy) \vdash \forall x Rxx$

3. $\exists x (Px \wedge \forall y Rxy), \neg \forall x \forall y Rxy, \neg \forall x Px$

4. $\forall x \forall y (Rxy \rightarrow \forall z (Szy \rightarrow Szx)), \forall x \forall y (Sxy \rightarrow \forall z (Rzy \rightarrow Rzx)), Rab \wedge Sbc \vdash \neg \exists x (Rxb \wedge Sxa)$

5. $\exists x (Qx \wedge \exists y (Py \wedge Rxy)), Pa \vdash \neg Qa \rightarrow \exists x (Qx \wedge Rxa)$