

PHIL 250  
INTRODUCTION TO SYMBOLIC LOGIC

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Instructor

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DEDUCTIVE EXERCISES

1. Translate the following arguments into English, using the translation manual

$Fx$  :  $x$  is friendly

$Gx$  :  $x$  is generous

$Lxy$  :  $x$  loves  $y$ .

2. Prove the arguments, using only basic deductive rules (introduction and elimination rules for the logical operators; the absurdity rule; the classical rules of double negation elimination, dilemma and reductio.)

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|-----|---|-----|--|
| 1.  | $\frac{\forall x Fx}{\exists x Fx}$   | 14. | $\frac{\forall x \forall y Lxy}{\forall x Lxx}$                                  |
| 2.  | $\frac{\forall x Fx}{\forall x \neg \neg Fx}$                                   | 15. | $\frac{\exists x Lxx}{\exists x \exists y Lxy}$                                  |
| 3.  | $\frac{\forall x \neg \neg Fx}{\forall x Fx}$                                   | 16. | $\frac{\forall x (Fx \rightarrow Gx)}{\forall x Fx \rightarrow \forall x Gx}$    |
| 4.  | $\frac{\exists x Fx}{\exists x \neg \neg Fx}$                                   | 17. | $\frac{\exists x Fx \rightarrow \exists x Gx}{\exists x (Fx \rightarrow Gx)}$    |
| 5.  | $\frac{\exists x \neg \neg Fx}{\exists x Fx}$                                   | 18. | $\frac{\exists x (Fx \wedge \neg Gx)}{\neg \forall x (Fx \rightarrow Gx)}$       |
| 6.  | $\frac{\exists x (Fx \wedge Gx)}{\exists x Fx}$                                 | 19. | $\frac{\exists x \neg Gx}{\forall x (Fx \rightarrow Gx)}$<br>$\neg \forall x Fx$ |
| 7.  | $\frac{\forall x (Fx \wedge Gx)}{\forall x Fx}$                                 | 20. | $\frac{\neg \exists x Gx}{\forall x (Fx \rightarrow Gx)}$<br>$\forall x \neg Fx$ |
| 8.  | $\frac{\exists x (Fx \vee Gx)}{\exists x Fx \vee \exists x Gx}$                 | 21. | $\frac{\exists x \neg Fx}{\forall x (Fx \vee Gx)}$<br>$\exists x Gx$             |
| 9.  | $\frac{\exists x Fx \vee \exists x Gx}{\exists x (Fx \vee Gx)}$                 | 22. | $\frac{\exists x \neg Fx}{\neg \forall x Fx}$                                    |
| 10. | $\frac{\forall x Fx}{\forall x (Fx \vee Gx)}$                                   | 23. | $\frac{\neg \exists x Fx}{\forall x \neg Fx}$                                    |
| 11. | $\frac{\forall x Fx \vee \forall x Gx}{\forall x (Fx \vee Gx)}$                 | 24. | $\frac{\forall x \neg Fx}{\neg \exists x Fx}$                                    |
| 12. | $\frac{\forall x (Fx \rightarrow Gx)}{\forall x (\neg Gx \rightarrow \neg Fx)}$ | 25. | $\frac{\neg \forall x Fx}{\exists x \neg Fx}$                                    |
| 13. | $\frac{\exists x \forall y Lxy}{\forall y \exists x Lxy}$                       |     |  |