

# Introduction to Logic

## *Practice Exam for Unit 4 (Exams 4 and 6):*

**Instructions.** For each of the following arguments, construct a formal derivation of the conclusion from the premises. (The premises are above the line, the conclusion below the line.)

- 1) 
$$\begin{array}{l} \forall x(Gx \leftrightarrow Hx) \\ \exists xHx \\ \sim Ha \\ \hline \text{SHOW } \exists xGx \ \& \ \sim \forall xGx \end{array}$$
- 2) 
$$\begin{array}{l} \forall x[(Fx \vee Gx) \rightarrow (Hx \ \& \ Ix)] \\ \sim \forall xHx \\ \hline \text{SHOW } \exists x \sim Fx \end{array}$$
- 3) 
$$\begin{array}{l} \forall x(\sim Hx \rightarrow \sim Fx) \\ \sim \exists x(Gx \ \& \ Hx) \\ \hline \text{SHOW } \forall x[(Fx \ \& \ Rxa) \rightarrow \sim Gx] \end{array}$$
- 4) 
$$\begin{array}{l} \forall xFx \vee \sim \exists xGx \\ \forall x(Fx \rightarrow \sim Hx) \\ \hline \text{SHOW } \forall x(Hx \rightarrow Gx) \rightarrow \sim \exists xHx \end{array}$$
- 5) 
$$\begin{array}{l} \forall x[Fx \rightarrow \forall y(Gy \rightarrow \sim Ryx)] \\ \hline \text{SHOW } \exists xFx \rightarrow \forall x(\forall yRxy \rightarrow \sim Gx) \end{array}$$
- 6) 
$$\begin{array}{l} \forall xFx \vee \exists x(Gx \ \& \ Hx) \\ \exists x \sim Fx \\ \hline \text{SHOW } \exists xHx \end{array}$$
- 7) 
$$\begin{array}{l} \exists x \exists y Lxy \\ \exists x \forall y (\exists z Lyz \rightarrow Lxy) \\ \hline \text{SHOW } \exists x Lxx \end{array}$$
- 8) 
$$\begin{array}{l} Rab \\ \exists z Raz \rightarrow \forall y (Rya \rightarrow \forall z Rza) \\ \hline \text{SHOW } \exists y \forall x Rxy \vee \exists y \forall x \sim Rxy \end{array}$$