7.2.x. Exercise questions

- 1. Restate, with unrestricted quantifiers, the generalizations below that employ restricted quantifiers—and vice versa. Write out English readings for the results.
 - **a.** $(\forall x: Fx) Gx$
 - **b.** $\forall x (Fx \rightarrow \neg Gx)$
 - **c.** $(\forall x: Fx \land \neg Gx) Hx$
 - **d.** $\forall x ((Px \land \neg Rxx) \rightarrow Rxa)$
 - e. $(\forall x: Rxa \land \neg Rbx) \neg (Fx \lor Gx)$
 - **f.** $\forall x ((Fx \lor Gx) \rightarrow (Hx \land \neg Kx))$
- **2.** Analyze the following in as much detail as possible, stating the resulting form using both restricted and unrestricted quantifiers:
 - a. Everyone had heard about the accident.
 - **b.** Every relative of Sam agreed with him about the issue.
 - **c.** Edna took pleasure in none of her possessions.
 - **d.** Tom found only empty boxes
 - **e.** The survey was sent to all members of the organization except its officers.
 - **f.** Only countries <u>bordering</u> the <u>Pacific</u> will prosper.
- **3.** State in idiomatic English the generalizations that could be represented symbolically by the following:
 - **a.** $(\forall x: x \text{ is a dog}) x \text{ chases cats.}$
 - **b.** $(\forall x: x \text{ is a hole})$ Holly patched x.
 - **c.** $(\forall x: x \text{ is a person}) \neg x \text{ volunteered}.$
 - **d.** $(\forall x: \neg x \text{ is a cockroach}) \neg x \text{ will survive.}$
 - **e.** $\forall x \neg x \text{ seemed right.}$
 - **f.** ($\forall x$: x was a reviewer $\land \neg x$ was a friend of the director) x panned the movie.
 - **g.** $(\forall x: x \text{ is a bird } \land \neg x \text{ is an early bird}) \neg x \text{ gets a worm.}$
 - **h.** $(\forall x: \neg x \text{ is a small child})$ the movie bored x.

Glen Helman 01 Aug 2004