

Practice Fourth Examination

Part A. Symbolization Symbolize the following sentences using the interpretation given below. If the sentence is ambiguous, provide only one symbolization.

D: Persons in Mr. Mogul's house the night he was shot.

B①: ① had blond hair.

D①②: ① despised ②

H①②: ① had an affair with ②

K①: ① knew the combination to the safe.

R①: ① had the revolver

S①: ① was in the study.

h: Colonel Horseradish (USMC, ret.)

m: Mr. Mogul (the millionaire twist-tie manufacturer)

n: Ms. Nosey (the glamorous reporter)

p: Mr. Pettifogger (the lawyer)

1. Colonel Horseradish had the revolver only if everyone who was in the study had blond hair.
2. Only those who knew the combination to the safe had the revolver.
3. Ms. Nosey despised someone who had an affair with Colonel Horseradish.
4. At least two people despised Mr. Mogul.
5. The person who had an affair with Colonel Horseradish despised everyone in the study.

Extras for practice:

- a. Neither Colonel Horseradish nor Ms. Nosey knew the combination to the safe.
- b. Unless Mr. Pettifogger had an affair with Ms. Nosey, Mr. Mogul despised everyone who had an affair with her.

Exam continues on the next page

Part B. Interpretations (Hint: keep in mind the *confinement equivalences* when doing the following problems. These appear in Chapter 8, p. 210. This hint will not appear on the fourth exam, but you will be given a list of confinement equivalences.)

6. Provide an interpretation in a small, finite domain that shows that the following set of sentences is consistent.
 $\sim \exists x E x d \quad \forall x \forall y \exists z (Jxy \rightarrow Ezx) \quad \forall x \exists y Jyx$
7. Provide an interpretation in a small finite domain that shows that the following argument is invalid.
 $\exists x \forall y (Gy \rightarrow x=y). \quad \forall x \forall y [Ixy \rightarrow (Gx \& Gy)]. \quad \therefore \sim \exists x \exists y Ixy$

Extra for practice: Provide an interpretation in a small finite domain that shows that the following are not quantificationally equivalent.

- c. $\forall y Ay \rightarrow \exists x Cx \quad \exists x \forall y (Cx \vee \sim Ay)$

Part C. Derivations Provide derivations that show that the following arguments are valid. Partial credit will be given for incomplete derivations that correctly do something that has the potential for leading to a complete derivation. You will be penalized for misusing the rules. It is better to leave a derivation incomplete than to “complete” it by misusing the rules.

11. $\forall x \exists y Fxy. \quad \forall x \forall y (Fxy \rightarrow Lxy). \quad \therefore \exists y Lay$
12. $\sim \exists x \forall y (Qax \vee Pcy). \quad \forall x \exists y (\sim Qax \rightarrow Mxy). \quad \therefore \forall x \exists y Mxy$
13. $\exists x \forall y (Ty \leftrightarrow x=y). \quad \forall x (Nx \leftrightarrow Tx). \quad \therefore \exists x [Nx \& \forall y (Ny \rightarrow x=y)]$