

Philosophy 225 --- Symbolic Logic  
 Midterm Exam -- Possible Answers  
 March, 2012

(1) The simplest interpretation is something like the following:

D = {0,1}  
 F: {<0,0>, <1,1>}  
 G: {<0,0>, <1,1>}

Another approach would be something like:

D = {0,1, 2, 3}  
 F: {<0,1>, <1,0>, <0,0>, <1,1>, <2,3>, <3,2>, <2,2>, <3,3>}  
 G: {<0,1>, <1,0>, <0,0>, <1,1>, <2,3>, <3,2>, <2,2>, <3,3>}

Note that the second sentence requires that if <0,1> ∈ F and <1,0> ∈ F, then <0,0> ∈ F too.

(2)

- a)  $(x)[\neg (\exists y)Lyx \rightarrow \neg Rxx]$  or  $(x)[Rxx \rightarrow (\exists y)Lyx]$
- b)  $(x)[\neg (\exists y)(Ly \wedge Lyx) \rightarrow (\exists z)Hxz] \rightarrow \neg (\exists w)(\exists u)Lwu]$
- c)  $(\exists x)[(\exists y)Lxy \wedge (\exists z)Lzx] \wedge \neg (x)[(\exists y)Lyx \rightarrow (\exists z)Lxz]$  , or  
 $(\exists x)[(\exists y)Lxy \wedge (\exists z)Lzx] \wedge (\exists x)[(\exists y)Lyx \wedge \neg (\exists z)Lxz]$

(3)

- a) Valid -- any interpretation
- b) Neither  
 True: D = {0}    F: {<0,0>}  
 False: D = {0,1}    F: {<0,1>, <0,0>}
- c) Neither  
 True: D = {0,1}    F: {<0,1>, <1,1>}  
 False: D = {0}    F:  $\Lambda$