Logic pset 11

Resources: HLW Ch 6 and Lectures 15 and 16

1. Represent the form of the following sentences in predicate logic. We've suggested appropriate symbols. (For the sentences about people, you don't need to add an extra predicate for "x is a person.")

   (a) Mary loves everyone who loves her. (m, Lxy)

   (b) Everyone loves their mother. (Lxy, Mxy)

   (c) Snape killed someone. (Kxy, s)

   (d) Some wizards only marry other wizards. (Wx, Mxy)

   (e) Anything that is greater or equal than both a and b is also greater or equal than c. $(a, b, c, x \leq y)$

2. Prove the following sequents using the propositional logic rules (including cut & replacement, if you want), plus UE and UI.

   (a) $\forall x(Fx \to Gx) \vdash \forall xFx \to \forall xGx$

   (b) $\forall xFx \wedge \forall xGx \vdash \forall x(Fx \wedge Gx)$

   (c) $\forall x\forall y(Fx \to Fy) \vdash \forall x(Fx \to \forall yFy)$
   Hint: you might first try proving $\forall y(P \to Fy) \vdash P \to \forall yFy$

   (d) $\forall x\forall yRxy \vdash \forall xRxx$