After identifying the predicate argument form of the following arguments test their validity using the tree method.

1. There is a philosopher who studies all philosophers. Therefore, there is a philosopher who studies himself.
2. Everybody loves Batman, but Batman loves nobody but me. Therefore, I am Batman.
3. There is nothing made of tin that is not cheap. No swords are made of lead. Not everything is either tin or lead. Therefore not all swords are cheap.
4. There is a man in town who shaves all men in town who do not shave themselves. Therefore there is a man in town who shaves himself.

Check the validity of the following argument forms using the tree method. If an argument is invalid, provide a counter-model.

1. \((\forall x)(Fx \supset Gx); (\exists x) \sim Fx; \text{ therefore } (\forall x)(Gx \lor \sim Fx)\)
2. \((\exists x) Fx \& (\exists x) Gx; \text{ therefore } (\exists x)(Fx \& Gx)\)
3. \((\forall x)(\exists y)(Fx \supset (Gxy \lor Gxx)); \text{ therefore } (\forall x)(\exists y)(Fx \supset Gxy)\)
4. \((\exists x)((Fx \lor Gx) \& Hx); \sim(\exists x)(Hx \supset Fx); \text{ therefore } (\forall x)(Hx \lor Fx)\)
5. \((\exists x)(Fx \& Gx); (\exists x)(Fx \& Hx); \text{ therefore } (\exists x)(Fx \& (Gx \& Hx))\)
6. \((\forall x)(Fx \supset Gx); (\exists x) \sim Gx; \text{ therefore } (\exists x) \sim Fx\)
7. \((\forall x)(Fx \supset Gx); \text{ therefore } (\forall x)Fx \supset (\forall x)Gx\)
8. \((\forall x)(Fx \lor Gx); \text{ therefore } (\forall x)Fx \lor (\exists x)Gx\)
9. \((\forall x)((Fx \& Gx) \supset Hx); \text{ therefore } (\forall x)(Fx \supset (\sim Gx \lor Hx))\)
10. \((\forall x)(\exists y)(Fx \supset (Fy \& Ryx)); \text{ therefore } (\exists x)(Fx \& Rxx)\)