A. For each of the following sentences, give an interpretation with domain \(\{1, 2, 3, 4\}\) and non-empty extension of “\(Rxy\)” that makes the sentence true, and another such interpretation that makes the sentence false.

1. \((\exists x)(y)(Ryx \to Ryy)\)

2. \((x)(y)(Rxy \to (\exists z)(Rxz \& Ryz))\)

3. \((x)[(y)(Ryx \to Rxy) \to (y)(Rxy \to Ryx)]\)

4. \((\exists x)(\exists y)(Rxy \& Ryx) \& (x)(y)[(\exists z)(Rxz \& Rzy) \to Rxy]\)

B. For each of the following pairs of sentences, give an interpretation that shows that the first sentence does not imply the second.

1. \((x)(\exists y)(Rxy \lor Ryx)\) \quad \((x)(\exists y)Rxy \lor (x)(\exists y)Ryx\)

2. \((\exists x)(y) \neg Rxy \& (\exists x)(y)Rxy\) \quad \((x)[(\exists y)Rxy \to (y)Rxy]\)

3. \((y)[(\exists z)Ryz \to (\exists z)Rzy]\) \quad \((y)[(z)Ryz \to (z)Rzy]\)

4. \((x)(\exists y)(Rxy \& \neg Ryx)\) \quad \((x)[(\exists y)Rxy \to (\exists y)Ryx]\)