

Exercises for

# Knowledge Representation for the Semantic Web

Pascal Hitzler  
Winter 2011

<http://www.semantic-web-book.org>  
(February 3, 2010)

---

**Exercise 2.1** Consider the RDF graph for the single triple `Mother rdfs:subClassOf Woman`. Write up an RDF graph with 5 nodes which is simply entailed by the previous graph.

**Exercise 2.2** Give an RDFS-interpretation which is a model for the triple from Exercise 2.1.

**Exercise 2.3** Model the following sentences from Exercise 1.6 in SROIQ:

1. Mary is a woman.
2. Every mother is a woman.
3. Mary is John's wife.
4. Mothers are women who are also parents.
5. At least one child of a grandparent has also a child.

**Exercise 2.4** Consider the knowledge base consisting of the axioms  $A \sqsubseteq B \sqcap C$  and  $C \sqsubseteq D$ . Show by arguing about models that  $A \sqsubseteq D$  is a logical consequence of this knowledge base.

**Exercise 2.5** Consider the knowledge base consisting of the axioms  $\text{Homo} \sqsubseteq \text{Primate}$  and  $\exists \text{speaksWith}.\top \sqsubseteq \text{Homo}$ , which has  $\exists \text{speaksWith}.\top \sqsubseteq \text{Primate}$  as logical consequence.

Find a representation of all three axioms as RDF Schema statements. Is the third triple RDFS-entailed by the first two triples?

**Exercise 2.6** Consider the knowledge base consisting of the three axioms  $\text{Unicorn} \sqsubseteq \text{Animal}$ ,  $\text{Unicorn} \sqsubseteq \text{Fictitious}$  and  $\text{Fictitious} \sqcap \text{Animal} \sqsubseteq \perp$ . Give a model of this knowledge base. Also give an interpretation of this knowledge base which is not a model.

**Exercise 2.7** Consider the knowledge base consisting of the five axioms  $\text{RRRated} \sqsubseteq \text{CatMovie}$ ,  $\text{CatMovie} \sqsubseteq \text{Movie}$ ,  $\text{RRated} \equiv (\exists \text{hasScript}.\text{ThrillerScript}) \sqcup (\forall \text{hasViolenceLevel}.\text{High})$ ,  $\text{Person} \sqsubseteq \neg \text{Movie}$  and  $\exists \text{hasViolenceLevel}.\top \sqsubseteq \text{Movie}$ .

Give an informal argument why  $\text{Person} \sqsubseteq \perp$  is a logical consequence of these.