Exercises for
Knowledge Representation for the Semantic Web

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Winter 2010
http://www.semantic-web-book.org
(February 23, 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 Homo $\sqsubseteq$ Primate and $\exists$speaksWith.$\top \sqsubseteq$ Homo, which has $\exists$speaksWith.$\top \sqsubseteq$ 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 Unicorn $\sqsubseteq$ Animal, Unicorn $\sqsubseteq$ Fictitious and Fictitious$\sqcap$Animal $\sqsubseteq \bot$. 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 RRRated $\sqsubseteq$ CatMovie, CatMovie $\sqsubseteq$ Movie, RRRated $\equiv (\exists$hasScript.ThrillerScript$) \sqcup (\forall$hasViolenceLevel.High), Person $\sqsubseteq \neg$Movie and $\exists$hasViolenceLevel.$\top \sqsubseteq$ Movie.

Give an informal argument why Person $\sqsubseteq \bot$ is a logical consequence of these.