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 `Fictitions`$\sqcap$`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`, `RRated` $\equiv$ ($\exists$`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.