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 \( A \sqsubseteq B \land C \) 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 \( \exists\text{speaksWith.}\top \sqsubseteq \text{Homo} \), 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 `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 \text{CatMovie}`, `\text{CatMovie} \sqsubseteq \text{Movie}`, `RRated \equiv (\exists\text{hasScript.ThrillerScript}) \sqcup (\forall\text{hasViolenceLevel.High})`, `\text{Person} \sqsubseteq \lnot\text{Movie}` and `\exists\text{hasViolenceLevel.}\top \sqsubseteq \text{Movie}`.
Give an informal argument why `\text{Person} \sqsubseteq \bot` is a logical consequence of these.