

Exercises for

Knowledge Representation for the Semantic Web

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Exercise 3.1 Translate the following axioms into RDF Turtle syntax.

1. $\text{Person} \sqsubseteq \neg \text{Movie}$
2. $\text{Mother} \sqsubseteq \text{Woman} \sqcap \exists \text{hasChild}.\top$
3. $\text{GrandParent} \sqsubseteq \exists \text{hasChild}.\exists \text{hasChild}.\top$
4. $\text{PersonCommittingSuicide} \sqsubseteq \exists \text{kills}.\text{Self}$
5. $\text{Fictitious} \sqcap \text{Animal} \sqsubseteq \perp$

Exercise 3.2 Consider the knowledge base consisting of the axioms $A \sqsubseteq B \sqcap C$ and $C \sqsubseteq D$. Show by using the tableaux algorithm that $A \sqsubseteq D$ is a logical consequence of this knowledge base.

Exercise 3.3 Consider the knowledge base consisting of the two axioms $\text{Homo} \sqsubseteq \text{Primate}$ and $\exists \text{speaksWith}.\top \sqsubseteq \text{Homo}$. Show by using the tableaux algorithm that $\exists \text{speaksWith}.\top \sqsubseteq \text{Primate}$ is a logical consequence of this knowledge base.

Exercise 3.4 Consider the knowledge base consisting of the three axioms $\text{Unicorn} \sqsubseteq \text{Animal}$, $\text{Unicorn} \sqsubseteq \text{Fictitious}$ and $\text{Fictitious} \sqcap \text{Animal} \sqsubseteq \perp$. Show by using the tableaux algorithm that this knowledge base is satisfiable.

Exercise 3.5 Consider the knowledge base consisting of the five axioms $\text{RRated} \sqsubseteq \text{CatMovie}$, $\text{CatMovie} \sqsubseteq \text{Movie}$, $\text{RRated} \equiv (\exists \text{hasScript}.\text{ThrillerScript}) \sqcup (\forall \text{hasViolenceLevel}.\text{High})$, $\text{Person} \sqsubseteq \neg \text{Movie}$ and $\exists \text{hasViolenceLevel}.\top \sqsubseteq \text{Movie}$.

Show by using the tableaux algorithm that $\text{Person} \sqsubseteq \perp$ is a logical consequence of this knowledge base.