Exercises for

Knowledge Representation for the Semantic Web

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Exercise 3.1 Translate the following axioms into RDF Turtle syntax.

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

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 $\texttt{Homo} \sqsubseteq \texttt{Primate}$ and $\exists\texttt{speaksWith}.\top \sqsubseteq \texttt{Homo}$. Show by using the tableaux algorithm that $\exists\texttt{speaksWith}.\top \sqsubseteq \texttt{Primate}$ is a logical consequence of this knowledge base.

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

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

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