2-AIN-108: Labs #5: Tableau Algorithm

Exercise 1. Conceptualize the knowledge captured in the following excerpt in form of a DL knowledge base $\mathcal{K}$:

> *A bachelor is a person who holds a bachelor's degree. Similarly, a master is a holder of master's degree and a doctor is anyone holding a doctoral degree (e.g., a PhD, MD, and so on). A teacher is someone who teaches a course. A teacher must be a doctor. Similarly, a TA is the assistant of a course. All TAs must have at least a master's degree. Students are those who attend courses. There are three types of students: bachelor students, master students, and doctoral students. A student of each kind cannot yet be a holder of a respective degree.*

Exercise 2. Find an interpretation such that each concept is non-empty.

Exercise 3. Are the following concepts are satisfiable w.r.t. $\mathcal{K}$? Simulate the run of the tableau algorithm to find out:

1. Student $\sqcap$ Teacher ;

2. Student $\sqcap$ Assistant .

Exercise 4. Use the tableau algorithm to prove that

$$\mathcal{K} \models \exists \mathsf{hasDegree}.\mathsf{Degree} \sqsubseteq \mathsf{Person} \,.$$

Exercise 5. Prove that the DL knowledge bases $\mathcal{K}_1$ and $\mathcal{K}_2$ are equivalent:

1. $\mathcal{K}_1 = \{A \sqcup B \sqsubseteq C\}$, $\mathcal{K}_2 = \{A \sqsubseteq C, B \sqsubseteq C\}$;

2. $\mathcal{K}_1 = \{A \sqcap B \sqsubseteq \bot\}$, $\mathcal{K}_2 = \{A \sqsubseteq \neg B\}$.