

Homework 1: Chapters 1 and 2

The following exercises are due at the beginning of class on Wednesday, October 2. Some of these problems may take a while to solve, so I recommend that you work on this assignment over the course of multiple days.

1. Do exercise 4 from section 1.7 of the book (p. 71)
2. Do exercise 12 from section 1.7 of the book (p. 72). You do not have to specify all of the logical rules, but should at least give examples of each major type of rule and describe how one would go about creating the rest.
3. Translate the following first-order predicate logic sentences into KIF:
 - a. $\text{In}(2,4) \wedge \text{Facing}(\text{north}) \wedge \neg \text{Dirt}(2,4)$
 - b. $\exists x,y \text{NearAgent}(x,y) \wedge \text{SampleAt}(x,y)$
 - c. $\forall x,c,u \text{TakesClass}(x,c) \vee \text{AttendsUniversity}(x,u) \Rightarrow \text{Student}(x)$
4. Do exercise 6 from section 2.6 of the book (p. 114).
5. Imagine a multi-agent system in which all agents use the KQML communication protocol and understand the KIF language, but the agents do not all necessarily understand the same ontologies. Also, agents do not know ahead of time if other agents understand the same ontologies they do. However, there is a single translator agent (known to all agents) that can translate KIF content using symbols from one ontology into equivalent content using symbols from another ontology. Describe a protocol that would allow all agents to exchange messages and (eventually) understand the message they receive. You should describe what performatives are needed, the format of the content of these messages, and the procedure agents use for determining which messages to send.