

Übungsblatt 9

Abgabe: Dienstag, 03.07.07 bis 13 Uhr

Exercise 1 (Modelling in FOL) (30 Points)

a) Give a suitable interpretation for the following sentences using a consistent vocabulary which you must define. Show explicitly the mapping between the symbols defined in your interpretation and the objects and relations defined in the sentences below.

1. Some students attended AI in summer 2007.
2. Not every student who attends AI passes it.
3. Only one student attended XML in summer 2007.
4. The best score in XML is always higher than the best score in AI.
5. Every person who buys a policy is smart.
6. No person buys an expensive policy.
7. There is an agent who sells policies only to people who are not insured.
8. There is a barber who cut the hair of all men in town whose do not cut their own hairs.
9. A person born in Brazil, each of whose parents is a Brazilian citizen or a Brazilian resident, is Brazilian resident by birth.
10. A person born outside Brazil, one of whose parents is a Brazilian citizen by birth, or a Brazilian resident, is Brazilian resident by birth.
11. Politicians can fool some of the people all of the time, and they can fool all of the people some of the time, but they can't fool all of the people all of the time.

b) Given your previously defined interpretation (1.a), represent the above sentences in FOL.

c) What axiom is needed to infer the fact *Female(Laura)* given the facts *Male(Jim)* and *Spouse(Jim, Laura)*?

Exercise 2 (Semantics in FOL) (10 Points)

For the sentence $\forall x,y ((A(x)\wedge B(x,y))\rightarrow A(y))$ state whether it is true or false, relative to the following interpretations. If false, give values for x and y witnessing that.

1. The domain of the natural numbers, where A is interpreted as "even" and B is interpreted as "equals".
2. The domain of the natural numbers, where A is interpreted as "even" and B is interpreted as "is an integer divisor of"
3. The domain of the natural numbers, where A is interpreted as "even" and B is interpreted as "is an integer multiple of"

4. The domain of the Booleans, true false, where A is interpreted as "false" and B is interpreted as " equals"
5. The domain of Wumpus World locations in the particular board where locations Y and Z contain pits, but all other locations are safe, and the relation symbol A is interpreted as "unsafe" and B is interpreted as "neighbours"
6. All Wumpus World boards, where A is interpreted as "safe" and B is interpreted as "neighbours".

(Adapted from <http://cnx.org/content/m12353/latest/>).