World Models Theory

Basic Notions

Solution 3.1 By now you should be able to do it without help.

Solution 3.2 ANSWERS:

- The first is true, both because of the semantic gap and because of the inherent diversity of people in terms of perception and goals.
- The second is true because it corresponds to the definition of abstraction as a fundamental process in modeling.
- The third is false because the ambiguity comes from using the same term in language for two different objects (or sets, or properties) in the world and not vice versa. For example, I can call a car as ”automobile” or as ”car” and no ambiguity is generated.

Solution 3.3 ANSWERS:

1. is true in that a model is a set of facts that are exactly nondecomposable representations.
2. is false in that a theory can also be incomplete with respect to the model.
3. is true by definition of domain.
4. is false because I could also define a language that is incomplete in the sense that it does not have an assertion for every fact in the domain.
5. is true because ER diagrams follow a construction syntax, that is, they are constructed on the basis of a language made up of symbols and precise rules of composition; it is therefore possible to construct a theory that maps to the diagram via an interpretation function.

Solution 3.4 ANSWERS:

1. is false because you have to define it on all atomic formulas.
2. is true. For example, a theory can correctly describe a shared subset of two different models. Dually, a single model can be described by two theories that are incomplete in different ways. There are many other cases. Try to elaborate them
3. is false because model checking means checking that the model M entails the theory T ($M \models T$), that is, for each assertion of T there is a fact in M, but T is not necessarily complete.
4. is true in that it follows from the very definition of logical consequence, i.e., if $T1 \models T2$ and $M \models T1$, then necessarily $M \models T2$; in fact, since each assertion in T2 is a logical consequence of one or more assertions in T1, all assertions in T1 that have correspondence with facts in M can be reformulated with subsets of T2.
5. is true by definition of representational language