

## World Models Theory

### Basic Notions

Solution **1.1** By now you should be able to do it without help.

Solution **1.2** 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 **1.3** ANSWERS:

1. is false because you have to define it on all the 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  $T2$ .