

## syn.1 Semantic Notions

sol:syn:sem:  
sec The central logical notions of *validity*, *entailment*, and *satisfiability* are defined the same way for second-order logic as they are for first-order logic, except that the underlying satisfaction relation is now that for second-order **formulas**. explanation A second-order **sentence**, of course, is a **formula** in which all variables, including predicate and function variables, are bound.

**Definition syn.1** (Validity). A sentence  $\varphi$  is *valid*,  $\models \varphi$ , iff  $\mathfrak{M} \models \varphi$  for every **structure**  $\mathfrak{M}$ .

**Definition syn.2** (Entailment). A set of sentences  $\Gamma$  *entails* a sentence  $\varphi$ ,  $\Gamma \models \varphi$ , iff for every **structure**  $\mathfrak{M}$  with  $\mathfrak{M} \models \Gamma$ ,  $\mathfrak{M} \models \varphi$ .

**Definition syn.3** (Satisfiability). A set of sentences  $\Gamma$  is *satisfiable* if  $\mathfrak{M} \models \Gamma$  for some **structure**  $\mathfrak{M}$ . If  $\Gamma$  is not satisfiable it is called *unsatisfiable*.

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## Bibliography