

## Truth versus Provability

I am conflating *truth* and *provability*, which are actually two separate concepts. A formula is said to be provable iff it can be deduced from axioms. For a temporal  $\text{TLA}^+$  formula, this means that it can be proved using only the axioms and proof rules of  $\text{TLA}^+$ . In principle, calling something a theorem asserts that it is provable.

Truth is a fuzzier notion; it is often taken to mean *validity*. A formula is valid iff it is true for every possible interpretation of the axioms. (A precise definition of *interpretation* is beyond the scope of both this hyperbook and my expertise.)

It is generally believed that, for the kinds of simple formulas of ordinary mathematics that occur in reasoning about systems, provability and validity are equivalent. Since the semantics of  $\text{TLA}^+$  is based on ordinary mathematics plus simple temporal logic, that should be true for all the  $\text{TLA}^+$  formulas that occur in this hyperbook. I will therefore continue to ignore the difference between provability and validity. Whenever I assert that a formula is true, I will mean that it is both valid and provable.