Predicate Logic:
Soundness and Completeness of Natural Deduction

Alice Gao
Lecture 17

Outline

Learning goals

By the end of this lecture, you should be able to:

▶ Define soundness and completeness.
▶ Prove that an inference rule is sound or not sound.
▶ Prove that a semantic entailment holds using the soundness and completeness theorems.
▶ Show that no natural deduction proof exists for a semantic entailment using the soundness and completeness theorems.

Revisiting the learning goals

By the end of this lecture, you should be able to:

▶ Define soundness and completeness.

▶ Prove that an inference rule is sound or not sound.

▶ Prove that a semantic entailment holds using the soundness and completeness theorems.

▶ Show that no natural deduction proof exists for a semantic entailment using the soundness and completeness theorems.