

How to Automatically Prove Every First-Order Theorem of the Reals

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The goal of this talk is two-fold. The first is to give an impression of what mathematical logic is all about. To put it bluntly: What do logicians do? Also, why are well known results in logic such as the independence of the Continuum Hypothesis and unsolvability of Hilbert's 10th problem considered "logic"?

The second goal is to argue that it's important for mathematicians to know what first-order logic is and what a first-order sentence is. After a short introduction to first-order logic, we will use a method called quantifier elimination to prove the following result of Tarski.

Theorem. *Every first-order sentence of the real numbers is provably true or provably false, and further there is an algorithm to decide whether a given sentence is true or false.*

Due to time constraints, a weaker or partial version of the above result will be proved in the talk.