



Invited Speaker

Damir Dzhafarov

Assistant Professor of Mathematics
University of Connecticut



Mathematics, Backwards and Forwards

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Abstract

Mathematics today benefits from having “firm foundations”, by which we usually mean a system of axioms sufficient to prove the theorems we care about. But given a particular theorem, can we specify precisely which axioms are needed to derive it? This is a natural question, and also an ancient one: over 2000 years ago, the Greek mathematicians were asking it about Euclid’s geometry. Reverse mathematics is a program in mathematical logic that provides a modern approach to this kind of question. A striking fact repeatedly demonstrated in this research is that the vast majority of mathematical propositions can be classified into just five main types, according to which axioms are needed to carry out their proofs. I will discuss these five categories, and what they reveal about relationships between different areas of mathematics. I will also mention a few notable examples of theorems that do not fit inside these five categories.