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The mathematics of definitions

Definability theory is an important part of logic and (especially) its applications, cutting across the traditional subdivisions of the field into Model theory, Proof theory, Set theory and Computability. In most cases, however, a serious attempt to study the objects which are *definable* in some specific way leads inevitably to a study of the *definitions* we accept: for a trivial example, to study the *computable functions* on the natural numbers, we must understand Turing machines (or some other *equivalent* computation model), which in turn brings up interesting problems not easily formulated or solved in terms of the functions that are computed, e.g., questions of complexity.

My aim in this talk is to examine whether some properties of systems of definitions can be formulated abstractly and then used to establish results about the definable objects which cannot (easily or at all) be proved directly. My emphasis will be on examples, some of them from Descriptive Set Theory, in which Lebesgue first identified the importance of studying definable functions (on the real numbers) in a classical 1905 paper. It will be an elementary, mostly expository talk, and I will assume only some knowledge of logic and Turing computability.