UTEP Mathematical Sciences

Dr. John Harding

Department of Mathematical Sciences
Hunter College
New Mexico State University

The Convolution Algebra

A key concept in several branches of logic is that of the complex algebra of a structure. Given a set X with a binary relation R, one constructs on the power set $P(X)$ an additional unary operation F via relational image, so for a subset A of X we define $F(A) = R[A]$. This extends naturally to the situation of more than one relation on X and to ternary relations and relations of higher arity.

This construction, also known under the name of Kripke semantics, is the essential tool to produce examples of modal algebras, the algebraic versions of modal logic. It is simple, visually appealing, and intuitively suggestive with terminology involving possible worlds. Its origins come from complex algebras in group theory where it is closely tied to Tarskiâ˘Źs study of relation algebras.

In this talk we assume no prior knowledge of the subject and present the basic ideas of complex algebras. We then introduce a new construction of the convolution algebra that generalizes complex algebras and provides examples of intuitionistic modal algebras.