

Title: Associative and quasitrivial operations on finite sets

Speaker: Jean-Luc Marichal (joint work with Miguel Couceiro and Jimmy Devillet)

Address: Mathematics Research Unit, University of Luxembourg, Maison du Nombre, 6, avenue de la Fonte, L-4364 Esch-sur-Alzette, Luxembourg

Email: jean-luc.marichal@uni.lu

Abstract:

We investigate the class of binary associative and quasitrivial operations on a given finite set. Here the quasitriviality property (also known as conservativeness) means that the operation always outputs one of its input values. We also examine the special situations where the operations are commutative and nondecreasing, in which cases the operations reduce to discrete uninorms (which are discrete fuzzy connectives playing an important role in fuzzy logic).

Interestingly, associative and quasitrivial operations that are nondecreasing are characterized in terms of total and weak orderings through the so-called single-peakedness property introduced in social choice theory by Duncan Black.

We also address and solve a number of enumeration issues: we count the number of binary associative and quasitrivial operations on a given finite set as well as the number of those operations that are commutative and/or nondecreasing.