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Oriented Incidence and a Generalization of Hypergraphs

Abstract for the Combinatorics Seminar 2009 September 8, 15

I. An Introduction

I will introduce an incidence-based orientation scheme for hypergraphs that combinatorially models $\{0, +1, -1\}$ -matrices. I will discuss the problem of translation versus extension of graph theoretic concepts to hypergraphic ones. I will introduce new hypergraphic structures and operations, with an emphasis on their relation to the classification of the minimal column dependencies of $\{0, +1, -1\}$ -matrices.

II. Balance and Dependency

I will discuss the notion of “balance” in oriented hypergraphs and complete the collection of oriented hypergraphic concepts related to the classification of the minimal dependencies of $\{0, +1, -1\}$ -matrices. Topics covered will include the decomposition of oriented hypergraphs into three families of varying degrees of “balance”, a discussion of the classification of the minimal dependencies of two of these families, and, if time permits, various open problems surrounding the remaining family.

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