
DEPARTMENT OF MATHEMATICS
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On the Cardinalities of Row Spaces of Boolean Matrices

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A Boolean matrix has entries that are 0 or 1. For any $n \in \mathbb{N}$, the set of all $n \times n$ Boolean matrices with the operation of matrix multiplication (except that $1+1 = 1$) is a semigroup with the usual identity. This semigroup is denoted B_n . Green's J -relation (on B_n) is defined as follows: given $A, B \in B_n$, A is said to be equivalent to B , if the principal ideal generated by A equals the principal ideal generated by B . The row space of a Boolean matrix is the set of all finite linear combinations of rows of the matrix (where the scalars forming the linear combination are either 0 or 1). We call the cardinality of a row space its row span. Every matrix in a given J -class has the same row span (MargTocl

