

1060-05-15

David Galvin* (dgalvin1@nd.edu), Department of Mathematics, 255 Hurley Hall, Notre Dame, IN 46556, and **John Engbers**. *The typical structure of H -colourings of regular bipartite graphs*. Preliminary report.

For a graph H (perhaps with loops), an H -colouring of a simple graph G is a function from the vertices of G to the vertices of H which maps adjacent vertices to adjacent vertices. With suitable choices of H , H -colourings can encode, for example, weighted independent sets and proper colourings of G . H -colourings are also referred to as *graph homomorphisms*.

We address the following question: in a typical (uniformly chosen) H -colouring of a regular bipartite graph G , what proportion of the vertices of G get mapped to each vertex of H ? For a very large class of graphs H , we can give a quite precise answer to this question. For example, we can say that in almost all proper $2k$ -colourings of a regular bipartite graph on N vertices, each colour will appear very close to $N/2k$ times.

The approach is through entropy, and extends work of J. Kahn from 2001 (who considered the size of randomly chosen independent sets of a regular bipartite graph). (Received January 14, 2010)