

List colourings of hypergraphs

The list chromatic number, or choice number, of a graph was introduced by Vizing and by Erdős-Rubin-Taylor in the '70s. The definition applies just as well to hypergraphs: for a hypergraph G , its list colouring number $\chi_l(G)$ is the smallest k such that, if every vertex be assigned a list of k colours from some palette, then each vertex can select a colour from its list so that no edge is monochromatic.

Alon in the '90s proved that, for a graph, $\chi_l(G) \geq (1/2 + o(1)) \log_2 d$, where d is the average degree of G . Following partial results of Haxell-Pei, Haxell-Verstraëte and Alon-Kostochka, it was shown by Saxton-T that $\chi_l(G) = \Omega(\log d)$ holds for simple r -uniform hypergraphs too. But what is the correct asymptotic value here? It turns out that for $r = 2$ and even for $r = 3$ one can get an exact answer, but, curiously, for $r \geq 4$ the situation becomes more involved. (Joint with Ares M  rou  h.)