MATEMATYKA
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Jakub PRZYBYŁO and Mariusz WOŹNIAK

Total weight choosability of graphs

Preprint Nr MD 042
(otrzymany dnia 26 I 2009)

Kraków 2009

Total weight choosability of graphs*

Jakub Przybyło†, Mariusz Woźniak
AGH University of Science and Technology, Al. Mickiewicza 30, 30-059 Kraków, Poland

January 27, 2009

Abstract

Suppose the edges and the vertices of a simple graph G are assigned k-element lists of real weights. By choosing a representative of each list, we specify a vertex colouring, where for each vertex its colour is defined as the sum of the weights of its incident edges and the weight of the vertex itself. How long lists ensures a choice implying a proper vertex colouring for any graph? Is there any finite bound or maybe already lists of length two are sufficient? We prove that 2-element lists are enough for trees, wheels, unicyclic and complete graphs, while the ones of length 3 are sufficient for complete bipartite graphs. Our main tool is an algebraic theorem by Alon called Combinatorial Nullstellensatz.

Keywords: graph labelling, neighbour distinguishing total weighting, total list weighting, vertex colouring
MSC: 05C78