On a combination of the 1-2-3 conjecture and the antimagic labelling conjecture

This paper is dedicated to studying the following question: Is it always possible to injectively assign the weights 1, ..., \(|E(G)|\) to the edges of any given graph \(G\) (with no component isomorphic to \(K2\)) so that every two adjacent vertices of \(G\) get distinguished by their sums of incident weights? One may see this question as a combination of the well-known 1-2-3 Conjecture and the Antimagic Labelling Conjecture. Throughout this paper, we exhibit evidence that this question might be true. Benefitting from the investigations on the Antimagic Labelling Conjecture, we first point out that several classes of graphs, such as regular graphs, indeed admit such assignments. We then show that trees also do, answering a recent conjecture of Arumugam, Premalatha, Bača and Semaničov -Feňovč kov. Towards a general answer to the question above, we then prove that claimed assignments can be constructed for any graph, provided we are allowed to use some number of additional edge weights. For some classes of sparse graphs, namely 2-degenerate graphs and graphs with maximum average degree 3, we show that only a small (constant) number of such additional weights suffices.

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