List-Coloring Certain Complete n-Partite Graphs

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Abstract

A graph is k-choosable if, for any assignment of lists of length k to each vertex, there is a proper coloring of the graph in which each vertex is assigned a color from its list. A graph is equitably k-choosable if, for any assignment of lists of length k to each vertex, there is a proper coloring of the graph in which every vertex is assigned a color from its list so that no color is used more than $\lceil \frac{n}{k} \rceil$ times, where n is the order of the graph. We show that if every graph in some hereditary set of graphs is equitably k-choosable, then every graph in that set is equitably $k+1$-choosable. However, we conjecture that there is a graph, $K_{3,3,2,2}$, that is equitably 4-choosable but not equitably 5-choosable. This conjecture depends on whether $K_{3,3,2,2}$ is 4-choosable or not. We show that $K_{n(2)}$ is n-choosable and $K_{n(3)}$ is not n-choosable, for any positive integer n. Furthermore, $K_{1(3),n-1(2)}$ is n-choosable for any positive integer n. However, the status of $K_{3,3,2,2}$ is still open.

keywords: equitably n-choosable, n-choosable, list coloring, vertex coloring