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On the chromatic uniqueness of certain bipartite graphs. (English) Zbl 0752.05030

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A graph G is chromatically unique if any other graph with the same chromatic polynomial is isomorphic to G. For example, it is known that the complete bipartite graph $K(n,m)$ is chromatically unique provided $n,m\geq 2$, as is the complete graph minus a single edge $K^{-1}(n,m)$ provided $n,m\geq 3$.

In this paper the author extends the investigation into the chromatic uniqueness of complete bipartite graphs minus 2, 3, or 4 edges. Let $K^{-r}(n,m)$ denote the class of complete bipartite graphs $K(n,m)$ with r edges removed. There are 3 graphs in $K^{-r}(n,m)$ when $r=2$, 6 graphs when $r=3$, and 16 graphs for $r=4$. The author derives a sufficient condition for a graph in $K^{-2}(n,m)$ to be chromatically unique. In particular, each such graph is chromatically unique when $|n-m|\leq 3$. Moreover, graphs with $|n-m|=d$ are chromatically unique provided that n is sufficiently large (an explicit polynomial bound is given). In the class $K^{-3}(m,m)$ any member is chromatically unique provided $|n-m|\leq 1$ (with a few small exceptions). In $K^{-4}(n,m)$ any graph is chromatically unique provided $n=m\geq 4$. Also, each graph in $K^{-4}(n,n+1)$ is chromatically unique for $n\geq 5$. A few other results of a similar nature are presented.

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