Minimum order of graphs with given coloring parameters

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Abstract

A triple f, g, h is realizable if there exists a connected graph with chromatic number f, Grundy number g, and achromatic number h. In [1], the set of all realizable triples has been determined.

Here we solve the following two problems: 1. For all realizable triples f, g, h of integers, what is the minimum number of vertices of the graph above? 2. Which are the extremal graphs for $f = g = 3, h \ge 9$?

References

 G. Chartrand, F. Okamoto, P. Zhang, Zs. Tuza: A Note on Graphs with Prescribed Complete Coloring Numbers, J. Combin. Math. Combin. Comput., 73(2010), pp. 77-84.