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On deciding whether the distinguishing chromatic number of a graph is at most two

A vertex k -coloring of graph G is distinguishing if the only color-preserving automorphism of G is the identity. The distinguishing chromatic number of G , $\chi_D(G)$, is the smallest k such that G admits a proper distinguishing k -coloring. When $k \geq 3$, deciding whether $\chi_D(G) \leq k$ is NP-hard. We show that when $k = 2$ this problem is at least as hard as graph automorphism but no harder than graph isomorphism. (With Hoàng, Sritharan, Stewart)