

Are Complete Graphs the Only χ -Robust-Critical Graphs?

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Given a proper k -coloring of a graph, a local recoloring of a vertex v is a proper k -coloring in which the color of v changes but the colors of vertices not in $N[v]$ remain the same. A proper k -coloring is robust if every vertex is locally recolorable. The robust-chromatic number, $\rho(G)$, is the smallest k for which graph G has a robust k -coloring. A graph G is χ -robust-critical if $\rho(G) = \chi(G)$, and for any vertex v , $\rho(G - v) = \rho(G) - 1$.

We conjecture that complete graphs are the only χ -robust-critical graphs. We show that K_4 is the only χ -robust-critical graph with chromatic number 4 and maximum degree less than or equal to 5.

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