

The proper conflict-free k -coloring problem and the odd k -coloring problem are NP-complete on bipartite graphs

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A proper coloring of a graph is proper conflict-free if every non-isolated vertex v has a neighbor whose color is unique in the neighborhood of v .

A proper coloring of a graph is odd if for every non-isolated vertex v , there is a color appearing an odd number of times in the neighborhood of v .

For an integer k , the PCF k -Coloring problem asks whether an input graph admits a proper conflict-free k -coloring and the Odd k -Coloring asks whether an input graph admits an odd k -coloring.

We show that for every integer $k \geq 3$, both problems are NP-complete, even if the input graph is bipartite. Furthermore, we show that the PCF 4-Coloring problem is NP-complete when the input graph is planar.

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