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STRONG MAJORITY COLOURINGS OF GRAPHS

Motivated by the notions of majority vertex-colourings of graphs and digraphs, as well as majority edge-colourings of graphs, we propose and study strong majority colourings.

A strong majority vertex-colouring is a function $c : V(G) \rightarrow C$ such that for any vertex $v \in V(G)$ and any colour $\alpha \in C$, at most half of the neighbours of v have colour α . The minimum number of colours in such a colouring we denote by $\text{Maj}(G)$. It occurs that there exist graphs with arbitrarily large $\text{Maj}(G)$. However, there is a tight upper bound $\text{Maj}(G) \leq 2\Delta(G) + 1$ for every graph with minimum degree $\delta(G) \geq 2$.

A strong majority edge-colouring is a function $c : E(G) \rightarrow C$ such that for every edge $e \in E(G)$ and every colour $\alpha \in C$, at most half of the edges adjacent to e have colour α . Let $\text{Maj}'(G)$ denote the minimum number of colours in such an edge-colouring of G . There exist a constant upper bound for $\text{Maj}'(G)$ for all finite graphs G . We conjecture that this constant is as small as 4. We confirm this conjecture for some classes of graphs.

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