



## SEMINARIUM MATEMATYKA DYSKRETNA

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### Strong majority colourings of graphs

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Motivated by majority vertex- and edge-colourings, we introduce two new graph invariants. A strong majority vertex-colouring is a function  $c : V(G) \rightarrow C$  such that for any vertex  $v \in V(G)$  and every colour  $\alpha \in C$ , at most half of the neighbours of  $v$  have colour  $\alpha$ . The minimum number of colours in such a colouring is denoted by  $\text{Maj}(G)$ . It occurs that there exist graphs  $G$  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  $\delta(G) \geq 2$ . We also define a strong majority edge-colouring as 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  $\alpha$ .  $\text{Maj}'(G)$  denotes 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.

This is joint work with Mateusz Kamyczura, Monika Pilśniak, and Mariusz Woźniak.