

# MAJORITY ADDITIVE COLORINGS AND THE MAXIMUM DEGREE

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Kamyczura [1, 2] introduced the notion of a majority additive  $k$ -coloring of a graph  $G$  as a function  $c : V(G) \rightarrow \{1, 2, \dots, k\}$  such that

$$\left| \left\{ u \in N_G(v) : \sum_{w \in N_G(u)} c(w) = s \right\} \right| \leq \max \left\{ 1, \frac{d_G(v)}{2} \right\}$$

for every vertex  $v$  of  $G$  and every positive integer  $s$ . We show that every graph  $G$  of maximum degree  $\Delta$  admitting a majority additive coloring has a majority additive  $\mathcal{O}(\Delta^2)$ -coloring. Under additional restrictions we improve this to sublinear in  $\Delta$ . We show that determining whether a majority additive  $k$ -coloring exists for a given graph is **NP**-complete for all  $k \geq 2$ .

## References

- [1] M. Kamyczura, Introduction to majority additive coloring. Applied Mathematics and Computation 508 (2026), 6 pp.
- [2] M. Kamyczura, presentation at the 10th Cracow Conference on Graph Theory. 22-26.09.2025, Cracow