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Almost-rainbow edge-colorings of some small subgraphs. (English) Zbl 1295.05151

Discuss. Math., Graph Theory 33, No. 4, 771-784 (2013).

Summary: Let $f(n,p,q)$ be the minimum number of colors necessary to color the edges of K_n so that every K_p is at least q-colored. We improve current bounds on these nearly "anti-Ramsey" numbers, first studied by Erdős and Gyárfás. We show that $-3f(n,5,9) \geq \frac{7}{4}n$, slightly improving the bound of *M. Axenovich* [Discrete Math. 222, No. 1–3, 247–249 (2000; Zbl 0969.05042)]. We make small improvements on bounds of *P. Erdős* and *A. Gyárfás* [Combinatorica 17, No. 4, 459–467 (1997; Zbl 0910.05034)] by showing $\frac{5}{6}n + 1 \leq f(n,4,5)$ and for all even $n \not\equiv 1 \pmod 3$, $f(n,4,5) \leq n-1$. For a complete bipartite graph $G = K_{n,n}$, we show an n-color construction to color the edges of G so that every $C_4 \subseteq G$ is colored by at least three colors. This improves the best known upper bound of *M. Axenovich* et al. [J. Comb. Theory, Ser. B 79, No. 1, 66–86 (2000; Zbl 1023.05101)].

MSC:

05C55 Generalized Ramsey theory
05C15 Coloring of graphs and hypergraphs
05C38 Paths and cycles

Keywords:

Ramsey theory; generalized Ramsey theory; rainbow-coloring; edge-coloring; Erdős problem

Full Text: DOI arXiv