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Graphs that require many colors to achieve their chromatic sum. (In English)

Combinatorics, graph theory, and computing, Proc. 20th Southeast Conf., Boca Raton/FL (USA) 1989, Congr. Numerantium 71, 17-28 (1990).

[For the entire collection see Zbl 688.00003.]

The chromatic sum $\Sigma(G)$ of a graph G is the minimum sum $\Sigma c(v)$ taken over all proper vertex-colourings c of G using positive integers, i.e. c: $V(G) \to N$, and $c(v) \neq c(w)$ whenever $(v, w) \in E(G)$. A proper colouring c is called best, if $\Sigma c(v) = \Sigma(G)$. The paper gives a constructive proof of the unexpected property, that for any $k \geq 2$ and any positive integer t there exist k-chromatic graphs for which any best colouring must use at least $k + t$ colours. For trees ($k = 2$) this was obtained in an earlier paper by *E. Kubicka* and *A. J. Schwenk* [Proc. 17th Ann. ACM Comp. Sci. Conf., ACM Press, 39- 45 (1989)]. To obtain small graphs G in terms of k and t is the main object of the paper, and for $t = 1$ the optimum is achieved.

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Classification:
05C15 Chromatic theory of graphs and maps
05C35 Extremal problems (graph theory)

Keywords:
chromatic sum