THE SIGNED TOTAL ROMAN k-DOMATIC NUMBER
OF A GRAPH

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Abstract

Let \( k \geq 1 \) be an integer. A signed total Roman \( k \)-dominating function on a graph \( G \) is a function \( f : V(G) \rightarrow \{-1, 1, 2\} \) such that \( \sum_{u \in N(v)} f(u) \geq k \) for every \( v \in V(G) \), where \( N(v) \) is the neighborhood of \( v \), and every vertex \( u \in V(G) \) for which \( f(u) = -1 \) is adjacent to at least one vertex \( w \) for which \( f(w) = 2 \). A set \( \{f_1, f_2, \ldots, f_d\} \) of distinct signed total Roman \( k \)-dominating functions on \( G \) with the property that \( \sum_{i=1}^{d} f_i(v) \leq k \) for each \( v \in V(G) \), is called a signed total Roman \( k \)-dominating family (of functions) on \( G \). The maximum number of functions in a signed total Roman \( k \)-dominating family on \( G \) is the signed total Roman \( k \)-domatic number of \( G \), denoted by \( \text{d}_{stR}^k(G) \).

In this paper we initiate the study of signed total Roman \( k \)-domatic numbers in graphs, and we present sharp bounds for \( \text{d}_{stR}^k(G) \). In particular, we derive some Nordhaus-Gaddum type inequalities. In addition, we determine the signed total Roman \( k \)-domatic number of some graphs.

Keywords: signed total Roman \( k \)-dominating function, signed total Roman \( k \)-domination number, signed total Roman \( k \)-domatic number.

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References


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