ON THE RESTRAINED ROMAN DOMINATION IN GRAPHS

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A Roman dominating function (RDF) on a graph $G$ is a function $f: V(G) \rightarrow \{0, 1, 2\}$ satisfying the condition that every vertex $v$ for which $f(v) = 0$, is adjacent to at least one vertex $u$ for which $f(u) = 2$. The weight of a Roman dominating function $f$ is the value $f(V(G)) = \sum_{v \in V(G)} f(v)$. The Roman domination number of $G$, denoted by $\gamma_R(G)$, is the minimum weight of an RDF on $G$. For a given graph, a Roman dominating function $f = (V_0, V_1, V_2)$ is a restrained Roman dominating function (rRDF) if every vertex of $V_0$ has a neighbor in $V_0$. The restrained Roman domination number of $G$, denoted by $\gamma_{rR}(G)$, is the minimum weight of an rRDF on $G$. We first show that the restrained Roman domination problem is NP-complete. Then we give various bounds and characterizations. Finally we study restrained Roman domination in random graphs.

Keywords: Roman domination, restrained Roman domination, complexity, probabilistic method, random graph.

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References
