Changing and Unchanging in Roman Domination

Nader Jafari Rad
Shahrood University of Technology
Iran

A Roman dominating function on a graph $G = (V, E)$ is a function $f : V(G) \to \{0, 1, 2\}$ satisfying the condition that every vertex $u$ for which $f(u) = 0$ is adjacent to at least one vertex $v$ for which $f(v) = 2$. The weight of a Roman dominating function is the value $f(V(G)) = \sum_{u \in V} f(u)$. The Roman domination number, $\gamma_R(G)$, of $G$ is the minimum weight of a Roman dominating function on $G$. We study the critical concept for Roman domination in graphs. In particular, we characterize:

(1) Roman domination vertex critical trees, as well as unicyclic graphs,
(2) Roman domination edge critical trees, as well as unicyclic graphs, and
(3) Roman domination supper edge critical graphs. In addition, we study analogous questions of domination critical graphs for Roman domination.