

# Nordhaus-Gaddum Bounds for $k$ -Domination in Graphs

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## Abstract

A  $k$ -dominating set of a graph  $G$  is a set  $S$  of vertices of  $G$  such that every vertex outside of  $S$  has  $k$  neighbors in  $S$ . The  $k$ -domination number of  $G$ , written  $\gamma_k(G)$ , is the size of the smallest  $k$ -dominating set in  $G$ . In this paper, we derive sharp upper and lower bounds on  $\gamma_k(G) + \gamma_k(\overline{G})$  and  $\gamma_k(G)\gamma_k(\overline{G})$ , where  $\overline{G}$  is the complement of  $G$ . We use the results for  $k = 2$  to prove a conjecture of Alon, Balogh, Bollobás, and Szabó on game domination numbers.