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Independent Domination, Domination and Chromatic Number

An independent dominating set D is any set of vertices in a graph G such that no vertices in D are adjacent, but every vertex in $V(G) - D$ is adjacent to a vertex in D . The independent domination number of G , denoted $i(G)$, is the cardinality of a minimum independent dominating set.

The following upper bounds have been found by Bollobás & Cockayne and MacGillivray & Seyffarth, respectively:

$$i(G) \leq n - \gamma(G) - \left\lceil \frac{n - \gamma(G)}{\gamma(G)} \right\rceil + 1$$
$$i(G) \leq n - \chi(G) - \left\lceil \frac{n - \chi(G)}{\chi(G)} \right\rceil + 1$$

where $n = |V(G)|$, $\gamma(G)$ is the domination number of G and $\chi(G)$ is the chromatic number of G . I will discuss the characterization of those graphs for which equality is achieved for the first upper bound and the problem of determining those instances for which the first upper bound provides a better result than the second.