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# Graph Algorithms with Hostile Partners

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**Abstract**

A short description of the project goes here.

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# Introduction

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# Dominating sets

We begin by listing some definitions.

**Definition.** The Dominating set, $D$, of a graph $G = (E, V)$ is any subset of $V$ such that every vertex in $V$ is adjacent to at least one vertex in $D$.

**Definition.** The Dominating number, $\gamma(G)$, of a graph $G = (E, V)$ is the size of the smallest dominating set of $G$.

**Definition.** Independent set, max independent set, indepence number $\alpha(G)$

## 2.1 min size dominating set

**Lemma 2.1.** *Let $G$ be a graph and $X$ be a subset of the vertices of $G$.*

*The minimum size of a dominating set is greater than or equal to the size of the maximum independent set.*

Recall that $\chi(G)$ is the chromatic number of the graph $G$.

*Proof.* Let $X$ be a minimum dominating set in the graph $G$. □

**Theorem 2.2** (Willis 2011 Theorem 3.1)**.** *For any graph $G = (V, E)$ [1]*

$$\alpha \leq \frac{|V|}{\chi(G)}$$

**Theorem 2.3.** *Let $G$ be a graph, such that the number of vertices in $G$, $n$, is $\geq 4$. Then for any $G$,*

$$\gamma_g(G) \geq \left\lceil \frac{n}{2} \right\rceil$$

*Proof.* asd □

# Bibliography

[1] WILLIS, W. Bounds for the independence number of a graph.