Princeton Discrete Math Seminar

Friday, October 12th — Department of Mathematics

2:15-3:15pm — Fine Hall, Room 224

On the duality between independence and domination

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This talk introduces several results relating the dominating sets in a graph to the independent sets.

A *jointly independent set* for graphs $G_1, G_2, \ldots, G_r$ is an independent set in the union of the graphs G_i, namely a set independent in all of the graphs. This notion has a fractional counterpart. For a graph G we denote by $\Omega(G)$ the polytope in $\mathbb{R}^V$ whose vertices are the incidence vectors of the independent sets of G. Let $\Omega(G_1, ..., G_r) = \bigcap_{i \leq m} \Omega(G_i)$. Write $\alpha^*(G_1, ..., G_r) = \max\{\vec{1} \cdot \vec{x} : \vec{x} \in \Omega(G_1, ..., G_r)\}$. Also write: $\gamma(G_1, ..., G_r)$ for the minimal number of non-punctured neighborhoods in the graphs, whose union is V. One of the results that will be shown is that for any pair $\{G_1, G_2\}$ of graphs $\alpha^*(\{G_1, G_2\}) \geq \gamma(\{G_1, G_2\})$. For r graphs $G_1, G_2, \ldots, G_r$ we have $\alpha^*(\{G_1, G_2, \ldots, G_r\}) \geq \frac{2}{r}\gamma(\{G_1, G_2, \ldots, G_r\})$. This generalizes a result of Lovasz.

This is joint work with Ron Aharoni, Ron Holzmann and Ori Kfir.