"Counting matchings in graphs with applications to the monomer-dimer models"

Abstract:

Let $G = (V, E)$ be an undirected graph with vertices $V$ and edges $E$. A dimer is a domino occupying an edge $e = (u, v) \in E$ and a monomer is a single vertex $w \in V$. An $l$-match, or a monomer-dimer cover of $G$, is a subset $E'$ of $E$, of cardinality $l$, such that any two distinct edges $e, f \in E'$ do not have a common vertex. Let $\phi(l, G) \geq 0$ be the number of $l$-matchings in $G$ for any $l \in \mathbb{Z}_+$. In many combinatorial problems it is of interest to estimate from above and below the number $\phi(l, G)$. In the monomer-dimer models in statistical mechanics, as the integer lattice $\mathbb{Z}^d$, or the Bethe lattice, i.e. an infinite $k$-regular tree, one needs to estimate the number of $l$ matching in bipartite regular graphs. Moreover, one needs to estimate the corresponding quantities $h_G(p)$, called the monomer-dimer entropy, for dimer density $p \in [0, 1]$, for infinite graphs $G$. In this lecture we will survey the recent developments in this area and pose several conjectures.

The slides of the lecture are available at http://www.math-berlin.de/images/stories/friedland.pdf

Friday, December 12, 2008
3:00 PM in 372 Jabara Hall

Please come join us for refreshments before the lecture at 2:30 p.m. in room 353 Jabara Hall.