MATH 4022 Graph Theory (Fall '10)

Instructor: Asaf Shapira

Home Assignment 2

Due date: 10/12/10

Please submit organized and well written solutions!

Problem 1. Let G be a 3-regular graph. Show that its edge-connectivity equals its vertex-connectivity.

Problem 2. Compute the number of labeled spanning trees of the complete bipartite graph $K_{m,n}$.

Problem 3. Compute the number of labeled trees in which all degrees are either 1 or 3.

Problem 4. Let G be a bipartite graph on vertex sets $A = \{a_1, \ldots, a_n\}$ and $B = \{b_1, \ldots, b_m\}$. Suppose every vertex in A has degree *at least* q and every vertex in B has degree *at most* r. Show that B contains n disjoint sets $S_1, \ldots, S_n$, each of size at least $\lfloor q/r \rfloor$ such that for every $1 \leq i \leq n$ vertex a_i is connected to all the vertices in S_i.

Problem 5. Derive Hall's Theorem from the König-Egerváry Theorem.