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Spanning Trees of Many Different Weights

We weight the edges of a graph X with elements of an abelian group G. The weight $w(T)$ of a spanning tree T is the sum of the weights of its edges. In 1990, Seymour and Schrijver conjectured the lower bound

$$\#\{w(T) : T \text{ is a spanning tree of } X\} \geq |H|\Big(1 - rk(X) + \sum rk(E_Q)\Big).$$

Here H is the stabilizer of the set on the left. The sum runs over the H-cosets Q in G. Also rk is the (matroidal) rank function, and E_Q is the set of edges of X whose weight lies in Q.

In fact, they propose an analagous conjecture for any weighted matroid, and they prove it in the case G has prime order. Here we prove the Seymour–Schrijver Conjecture in case G has order pq, where p and q are prime, and also in case G is the cyclic group of order p^k.

This is joint work with Matt Devos and Bojan Mohar.